MOTOR AGE

Vol. XXXII
No. 21

CHICAGO, NOVEMBER 22, 1917

Ten cents a copy
Three dollars a year

Automobile Dealers!

New Hudson Contracts are Now Being Signed.
Perhaps There is a Place for You

Hudson dealers have just closed another prosperous year.

Contracts are now being signed for another season. The line of cars that are to carry the Super-Six prestige, and the Company policies that are to accompany them assure another prosperous period for Hudson dealers.

Few changes are made in the Hudson distributing and selling organization. Men who have been identified with Hudson long, value the advantages in representing a car which holds such popularity with the public. Consequently, they seldom permit any condition to arise which will interrupt the continuation of the happy, prosperous relationship they enjoy with the Hudson.

Still, changes for one cause or another do occur and, therefore, this announcement is addressed to those who have felt they have been unfortunate in the line of cars they have had and who feel that with the right car they could give full scope to their abilities. The Hudson line gives great advantage to any dealer in increased prestige. A similar quality of prestige is demanded for the car from the dealer. Wherever such support is not received, changes become necessary.

If you feel you can improve Hudson representation in your locality, we suggest you write the factory. Perhaps we too recognize the importance of improving our representation.

HUDSON SUPER SIX

HUDSON MOTOR CAR CO.

Detroit, Michigan

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Warning!

The only way you can be positively sure that your radiator won't freeze up is to use a non-evaparating anti-freeze preparation. Alcohol evaporates so fast that its use is attended by constant worry. Besides you are asked to conserve the alcohol supply for use in explosives.

Insure your radiator today with Johnson's Freeze-Proof; it is economical and easy to use—is guaranteed not to injure rubber, cloth, packing, or metal of any kind—does not rust or corrode metal—and raises the boiling point of water 12° to 25°.

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We manufacture a complete line of products for Keeping Cars Young, including Johnson's Prepared Wax, Johnson's Cleaner, Johnson's Carbon Remover, Johnson's Stop-Squeak Oil, etc. Use coupon for booklet which is full of valuable information to automobile owners

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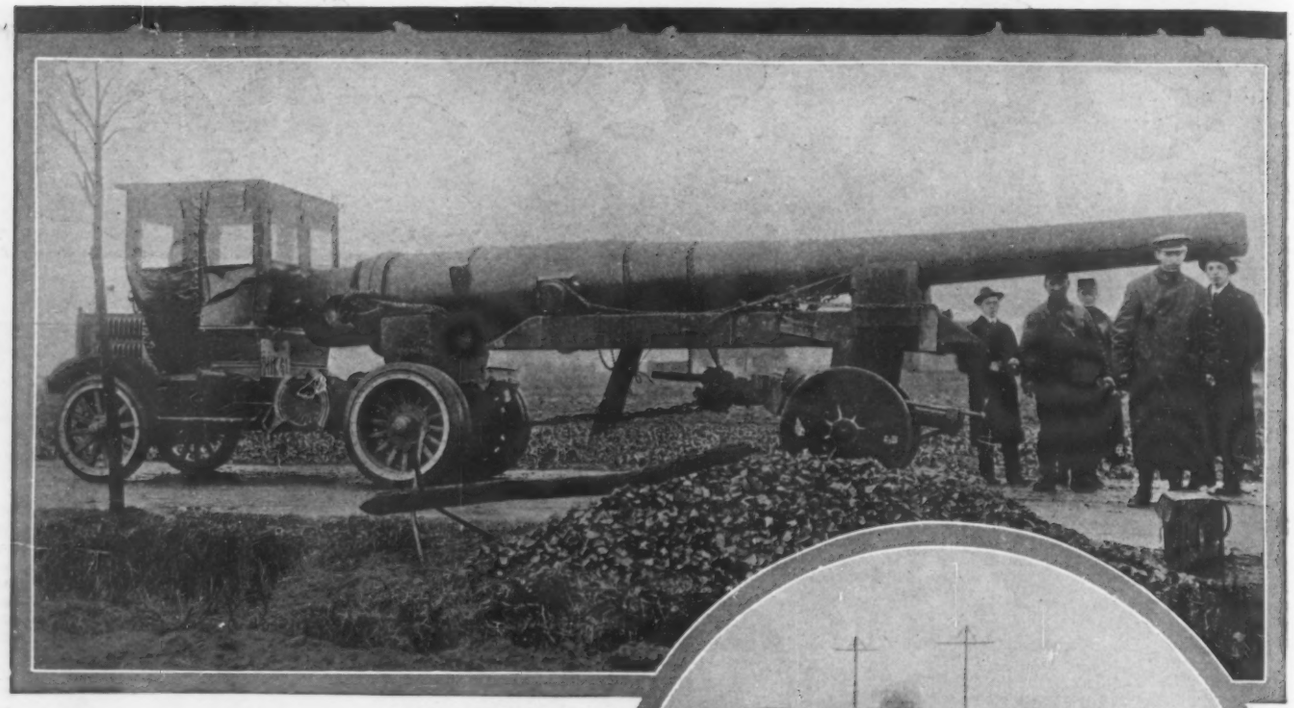

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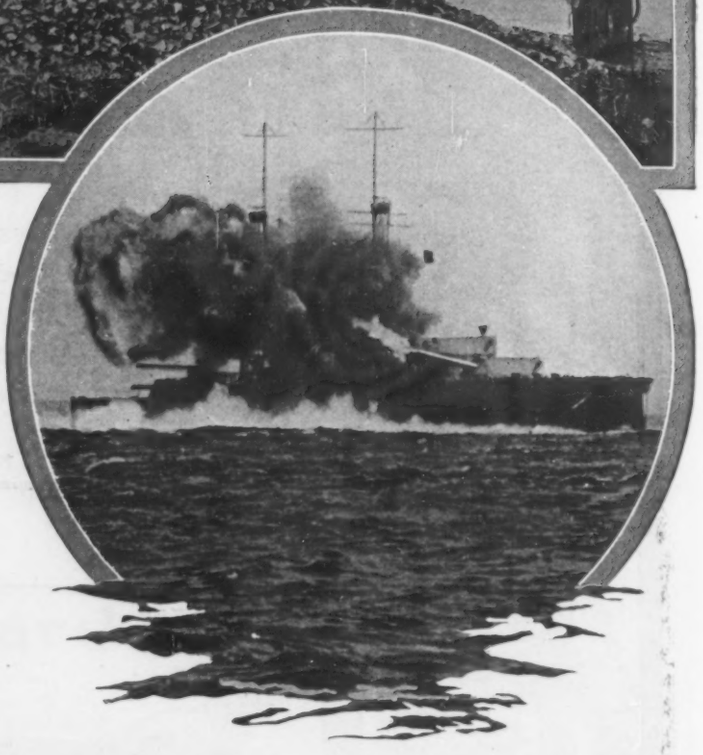

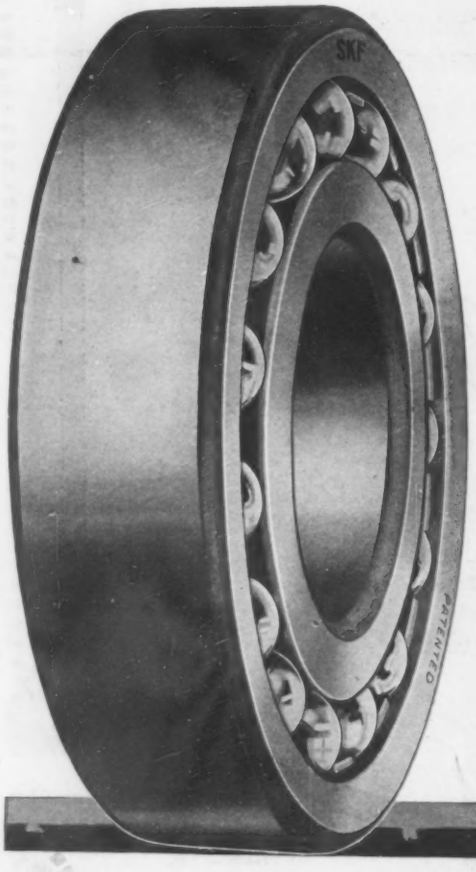

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SKF BALL BEARING CO.

HARTFORD CONN.

MOTOR AGE

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HAVING THE STAMINA FOR WAR

AMERICAN machinery, American railroads, American trucks will be put to as drastic a test as the man power of the nation. Their ability to accomplish and to endure will be a factor in winning the war. Production will rise to unheard-of levels—and men will be scarce. The war will absorb them. If more work is to be done, with fewer hands, *machinery will have to do it.*

In transportation, motor trucks will displace horse draft, to save drivers. For the same reason, larger, better, more efficient trucks will take the place of lighter and cheaper ones. Heavier loads, faster time, uninterrupted service will demand it.

Every operation must be adjusted to save men. They will be scarce and expensive. The truck which can do the most work and keep at it the longest is the best investment.

The essential thing is performance—doing the work—handling the volume—at low cost.

Every experienced truck user knows what a mechanical strain truck service imposes under ordinary conditions. Rough going, heavy loading, overspeeding, careless driving—all have their effect. Only the best mechanism survives.

Under war conditions high pressure work will intensify the strain. Only the highest grade trucks will be able to work uninterruptedly.

Never before have the manufacturing standards always so rigidly maintained in building White Trucks appeared so vital. In normal service it takes time to demonstrate the low operating cost and high performance of a White Truck. Under the stress of wartime traffic they show up quickly. It takes White stamina to perform and endure.

THE WHITE COMPANY, *Cleveland*

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Vol. XXXII, No. 21 CHICAGO, NOVEMBER, 22, 1917 $3.00 Per Year

MOTOR AGE

Curtailment of Industry Has Proved Unwise

As Testified by Great Britain

Memorial Suggests That Country Is Awakening to the Passenger Car as an Essential

By David Beecroft
Directing Editor Class Journal Co.

"THE FUTURE OF THE BRITISH MOTOR INDUSTRY BECOMES, THEREFORE, A MATTER OF MORE THAN SECTIONAL CONCERN; IT IS ONE OF IMPERIAL CONCERN."

THESE words from a memorial on the motor car industry in Great Britain suggest how that country is awakening to the fact that the motor car is an essential rather than a non-essential industry, even in Great Britain. After three years of war the British people are realizing that it is a matter of Imperial concern whether an industry such as the motor car is kept alive or let die as it literally has been so far as passenger cars is concerned.

This message from England, which arrived in this country last week, sheds a sidelight on the present attitude of our Government through the War Industries Board's classifying the motor car industry as a non-essential one. This message comes from the entire motor car manufacturing industry of England and also represents the views of the great national papers that for some time have been active in their advocation for more consideration of the industry in that country.

England Reached Cimax Nov. 1

It is a story frequently told in these columns that the motor car industry in England since the start of the war has been curtailed from month to month until the climax was reached Nov. 1, this year, when the use of motor cars for private purposes practically was stopped, excepting for such emergency uses as bringing a doctor or some equally important mission.

A leading motorist writing from London under date of Nov. 2 of this year says that on Nov. 1, when the latest prohibition of the motor car in England went into effect, the streets of London practically were denuded of cars, which was made all the more apparent because many of the taxicabs were tied up on a strike on that day. The situation to-day in England is that motoring does not exist. The manufacturers of passenger cars have not made any such vehicles for nearly eighteen months, in accordance with Government orders. Those with factories are making ammunition, airplane engines and parts and other war munitions.

English Truck Makers Upset

Manufacturers of motor trucks in some cases still are manufacturing trucks but in other cases are not. One of the largest English motor truck makers previous to the war is not manufacturing a single truck but is working its entire factory on airplane engines. Some motor car factories are manufacturing ambulances, others breech mechanism for large guns and ammunition of all sizes up to 15-in. shells.

Throughout England, Scotland and Wales, motor car dealers, all the repair shops and those garages that are fitted with machinery are engaged on Government work, producing parts of shells and making whatever their machine equipment enables them to manufacture. The sales-

rooms where motor cars were sold by retail mostly have been turned over to other uses, although there are still many places that have been kept open and which perhaps will be kept open until the end of the war.

With the start of the war, the motor car industry in England apparently agreed to turn over all factories for Government use. That was a truly patriotic movement. The Government thought it was necessary. The industry was willing. Three years of war have brought about a change in opinion, namely, that the sacrifice of the motor car industry is no longer a sectional matter but one of Imperial concern.

By describing the present situation as one of Imperial concern it is meant that the dominions of the British Empire such as Canada, Australia, India and South Africa are being so affected by the suppression of the industry as to make it perhaps necessary to take immediate steps to correct this situation.

The Association of British Motor and Allied Manufacturers, Ltd., has reviewed at length the circumstances that have and still are jeopardizing the industry in England, and the entire matter is of such moment that MOTOR AGE is dealing with this British review of the situation at length, because to-day we are threatened with the entering wedge of a similar jeopardizing policy.

Why Amercian Conditions Differ

From Washington there emanates continual evidences of a determined movement to turn the motor car industry over step by step to other uses. Washington seems to be following in nearly every detail the action of Great Britain in this respect, unfortunately without realizing that conditions are so different in America. Herein lies the danger of the whole movement, chiefly as England can borrow money from us to buy goods from us but we cannot go to other countries and borrow money from them to buy their merchandise. We must keep our industries intact not only to meet our own requirements but those of our allies as well. ENGLAND MADE INDIVIDUALISTIC TYPES OF CARS FOR THE WEALTHY CLASSES, BUT AMERICA BUILDS CARS FOR THE MASSES.

The loss of goodwill is one of the greatest dangers resting on the British industry because of the war restriction and conversion it has suffered.

"Goodwill is nothing more than the probability that the old customer will resort to the old place. Goodwill has developed a large international aspect and now might be defined as the very sap and life of business, without which business will yield little or no fruit.

"Although this definition of goodwill in business is applicable to individual businesses the extraordinary position presents itself to-day of a whole motor car industry suffering a loss of goodwill by reason of the fact that every individual firm engaged in that industry is compelled to turn its activities into such channels as may be directed by the state. This permits of speaking collectively of the goodwill of the entire British motor car industry.

"This is but a superficial view, because the various firms in the British motor industry are not all affected alike by the suppression and conversion nor is the future of them all imperiled to the same extent by the British Ministry of Munitions, which has had the work in charge. Whereas the makers of passenger cars for the most part have been obliged to turn aside from regular business and produce war munitions, the manufacturers of motor trucks have pursued practically the same form of work as before the war but on an enlarged and intensified scale.

"Further, the cessation of motor car manufacture has allowed American motor manufacturers to flood British dominions and neutral countries with their passenger cars and to build up a goodwill at the expense of the British producer.

"With very few exceptions the firms engaged in the manufacture of passenger cars previous to the war are now engaged upon work entirely unconnected with their usual business, to the complete disorganization of their careers, while the light-car section of the trade is threatened with the prospect of an invasion of American manufacturing interests.

Truck Makers Continue Activity

"On the other hand, motor truck manufacturers continue to turn out their own products. Consequently, while the general effects of the war have been the same, they differ very materially in many respects. Both have been restrained from doing ordinary business with customers, both have suffered great loss of goodwill, particularly in the colonies and in neutral lands. Both have invested their profits in buildings, plants and machinery, the value of which after the war is problematic, and both are subject to excess profit taxes and munitions levy.

"But the trade activities of the passenger car makers have been suspended and the motor truck maker is confronted with the unsuspected danger of over-production of trucks, which are nearly all of one capacity, as these have been poured into the theater of war and as the maintenance of them has been so good it is certain that great numbers of them will find their way back into commercial channels. It is obvious that the disposal of new trucks after the war alongside of these returned trucks must be a matter of grave concern to motor truck manufacturers.

"WE HAVE THE SPECTACLE OF A GREAT BRITISH INDUSTRY, IN WHICH IMMENSE CAPITAL, BOTH IN MONEY AND BRAINS, HAS BEEN INVESTED COMPLETELY DISORGANIZED AND CONFRONTED ON THE RETURN OF PEACE CONDITIONS NOT ONLY WITH INNUMERABLE PROBLEMS OF RE-CONSTRUCTION BUT ALSO WITH THE POSSIBILITY OF FINDING ITS FORMER MARKETS CONGESTED WITH RIVAL AND SECOND-HAND GOODS.

"IT IS ONE OF THE KEENEST IRONIES OF THE WAR THAT BRITISH MOTOR CAR MANUFACTURERS, WHO ARE DOING SO MUCH TO ASSIST IN BRINGING THE PRESENT CONFLICT TO A SUCCESSFUL ISSUE, SHOULD MORE THAN ANY OTHER TRADE, BE INCURRING THE RISK

OF THE WHOLE OR PRACTICAL LOSS OF THEIR REGULAR BUSINESS AS THE PENALTY OF DEVOTING THEIR ENERGIES AND THEIR ENTIRE RESOURCES OF THEIR FACTORIES DURING THESE CRITICAL YEARS TO THE SERVICE OF THEIR COUNTRY.

"It is, however, unfortunately true that very many firms whose plants are working at fullest capacity in the production of those instruments, without which the Germanic powers cannot be beaten to the ground, are precisely those who are now threatened with the loss of their most valuable and greatest asset—the goodwill of their names an dtheir products in the markets of the world."

The memorial goes on to explain how at the completion of the war many of the motor car makers who have been compelled to give up their business and produce only munitions will not have sufficient money at the signing of peace to do the necessary re-construction work on their own industry.

"THE PERMISSION ACCORDED MOTOR CAR MANUFACTURERS TO TAKE 20 PER CENT EXTRA PROFIT OVER PRE-WAR PROFITS IS INSUFFICIENT COMPENSATION IN VERY MANY CASES FOR THE LOSS OF GOODWILL. THIS ALLOWANCE OF AN ADDED 20 PER CENT WILL RARELY MEET THE COST OF REORGANIZATION AND OF SUCH EXTENSION OF BUILDINGS AND PLANTS AND ADVERTISING NECESSARY TO RESTORE THE BUSINESS TO THE PRE-WAR STATUS. THIS IS PARTICULARLY TRUE WITH THE SMALLER FIRMS.

Loss of Goodwill Threatened

"Manufacturers will face the proposition at the end of the war of finding large quantities of second hand cars on the market and any truck maker who has made large quantities of war trucks will find his goodwill seriously impaired if these are in a damaged condition."

The memorial recommends that for the protection of the British industry after the war that excessively heavy import duties be levied and that these continue for perhaps five years until the British makers have had a chance to reconstruct. It is suggested that such a tax should include accessories and all components entering into a car.

A change of heart in England regarding the motor industry is shown in the reference to the removal of heavy licenses and fuel taxes. The memorial recommends the removal of heavy license fees, as these tend to limit the extent of available markets.

The memorial pays a distinct tribute to the American motor car industry as one that has made such progress in manufacturing standardized vehicles. England before the war did not build standardized vehicles and now its makers have faced about and see the necessity of the standardized car.

"THE WAR HAS TAUGHT MANY LESSONS, NOT THE LEAST OF WHICH IS THE FACT THAT IT PAYS TO CONCENTRATE UPON A SINGLE TYPE OF VEHICLE AND BUILD IT IN QUANTITIES. THE ONE-PRICE POLICY IS ALSO DESIRABLE AS IT LEADS TO CO-OPERATION AMONG MANUFACTURERS.

"THAT SOME CO-OPERATIVE POLICY AMONG MOTOR CAR MANUFACTURERS IS EMINENTLY DESIRABLE IS FREELY ADMITTED, AS EACH MEMBER OF A GROUP OF MANUFACTURERS COULD CONCENTRATE UPON A SINGLE MODEL, NOT COMPETING WITH OTHERS IN THE GROUP.

"THEREFORE, IF THE MOTOR CAR INDUSTRY IS TO EMERGE SUCCESSFULLY FROM THE COMPETITION WHICH WILL FOLLOW THE COMING OF PEACE, IT MUST SET TO WORK TO INTRODUCE METHODS ALTOGETHER NOVEL TO MANY ENGAGED IN IT. THE PRESENT LAISSER-FAIRE METHOD MUST GIVE WAY TO HUSTLE. COMPETITION BETWEEN FIRMS IN THE SAME LINE OF BUSINESS MUST GIVE WAY TO CO-OPERATION, SPECIALIZATION AND ORGANIZATION OF THE HIGHEST ORDER.

"THE BRITISH MOTOR INDUSTRY HAS PROVED ITSELF VITAL FOR THE PURPOSES OF WAR AND IT IS EQUALLY VITAL FOR THE PURPOSES OF PEACE."

In conclusion:—

Let Us Reconsider Restricting

Why should America place one of its most patriotic industries in a position similar to that in which the motor car industry of Great Britain finds itself to-day?

Why should we make the error of England in disorganizing and almost wrecking an industry that is essenital and necessary to the winning of the war as well as to the future of the nation?

WHY SHOULD WE NOT TO-DAY READ BETWEEN THE LINES EXTRACTED FROM THIS MEMORIAL OF THE BRITISH INDUSTRY AND TAKE THE LESSONS UNTO OURSELVES, AND NOT RENDER CHAOTIC THE THIRD INDUSTRY OF THE LAND WHEN IT IS NOT NECESSARY TO DO IT?

POSITIVE POLICIES AND NOT NEGATIVE POLICIES WILL WIN THIS WAR. THE NEGATIVE POLICY OF SHUTTING OFF ELECTRIC SIGNS TO SAVE COAL ONLY ACCOMPLISHES A VERY SMALL SAVING OF COAL, NOT NEARLY A TENTH OF 1 PER CENT. THE MORE POSITIVE POLICY IS TO GET THE CAPACITY OF OUR COAL MINES ABOVE 80 PER CENT CAPACITY, WHERE THEY ARE AT PRESENT.

THIS WAR WILL NEVER BE WON BY NEGATIVE ACTION.

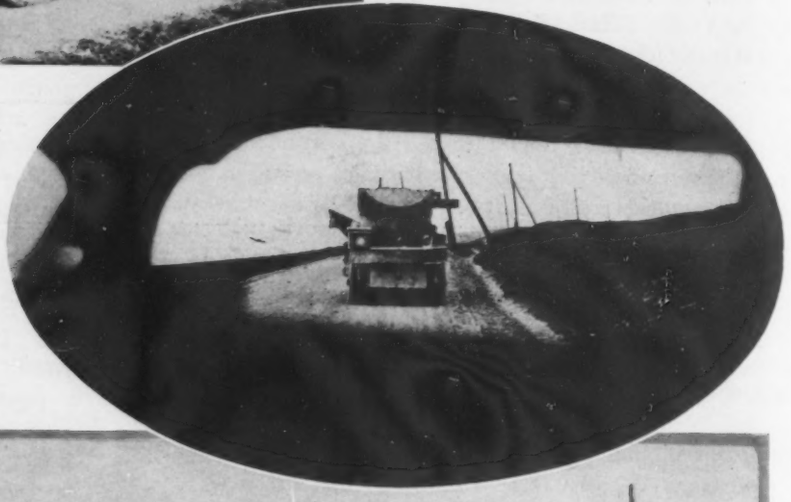
This war will never be won by limiting or restricting production but by increasing production. We must increase our national production or lose the war. We must get our steel mills operating at over 80 per cent efficiency. When we get our steel mills at 100 per cent efficiency and then have not steel enough, it is then time to talk of restricting industries, but not until then.

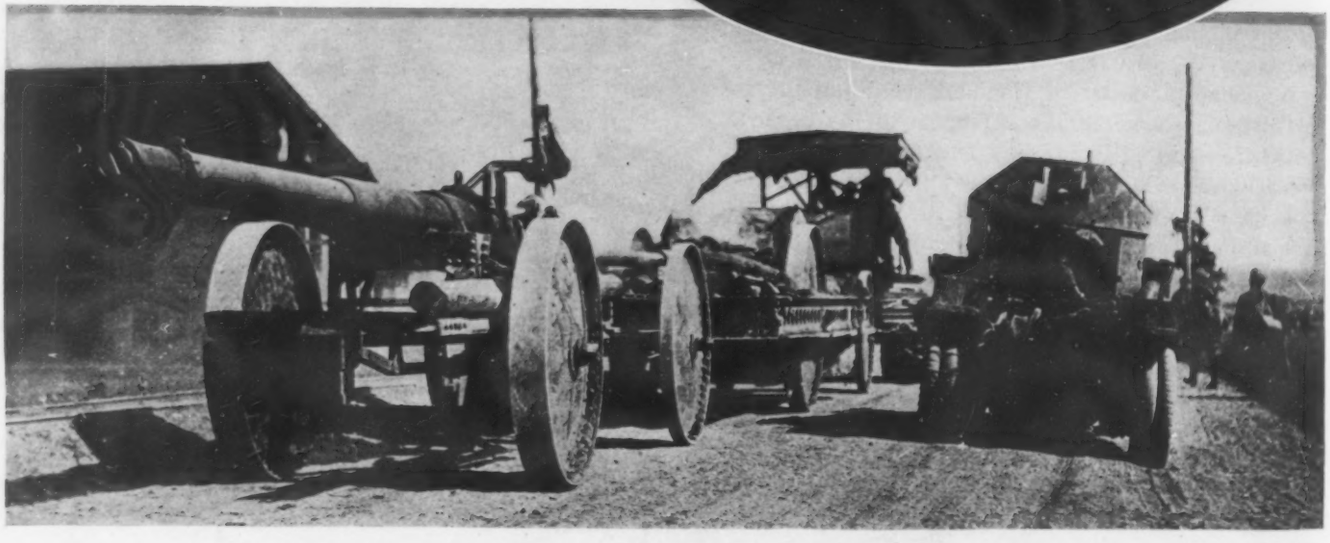
WITH THE MOTOR ARMY WHERE WAR DEMANDS THE BEST OF EVERY ENGINE

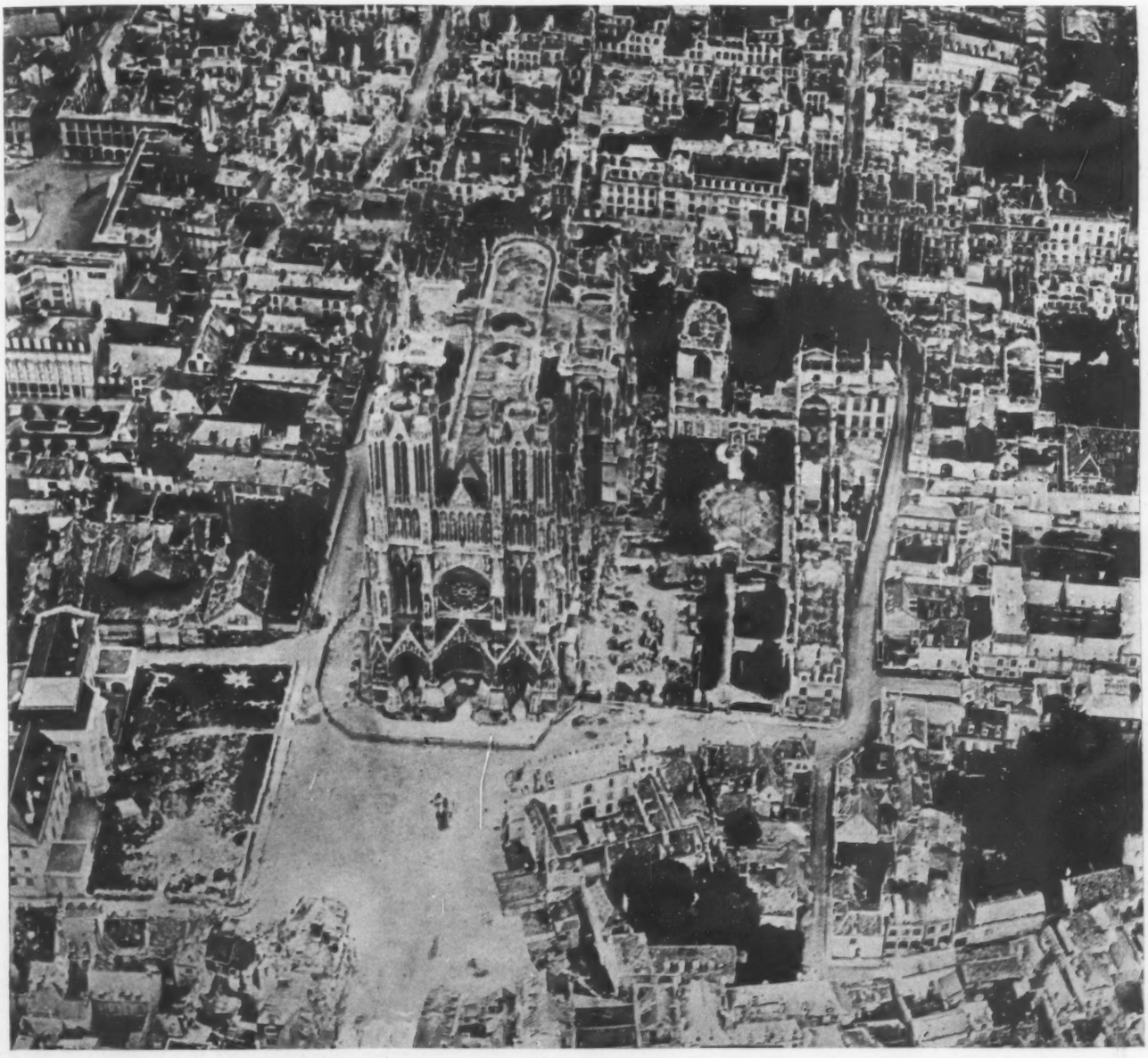
The American military hospital at Neuilly has been taken over by the American Medical Corps in France. The 1100 ambulance drivers in the American Field Service were asked to enlist in the Medical Corps, and those who declined were sent home. Most of the men in this service are college men

Below is an unusual photograph of one of the British armored cars that helped in the Galician retreat, a view through the eye slit of another armored car, such as that shown to the left. Note the disk on the side of the car. It is tricolored and shows the car belongs to the allies

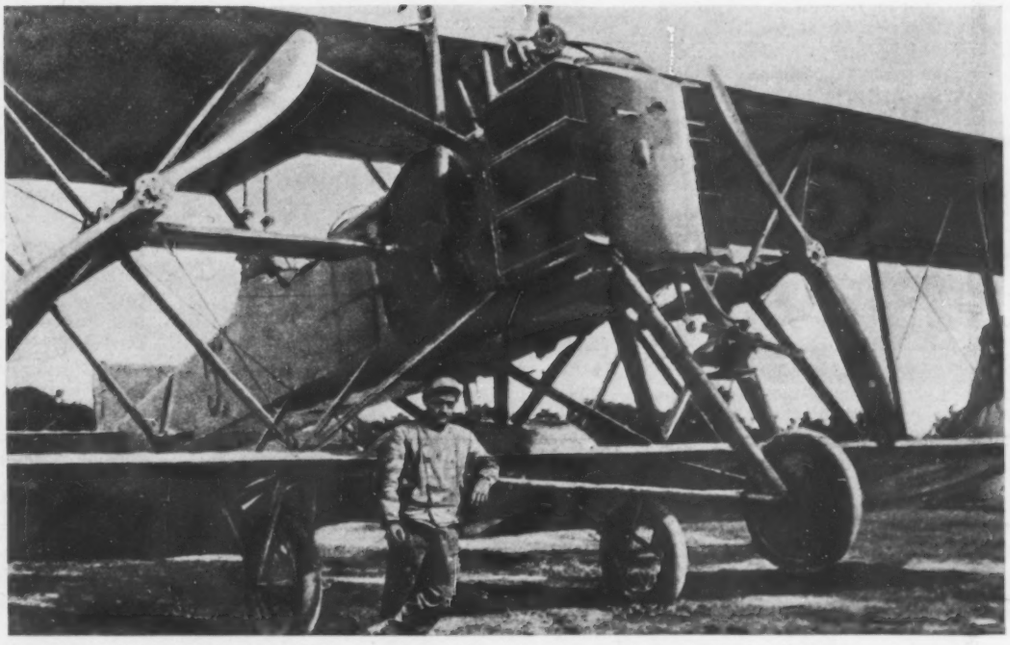
British armored cars of the squadron that saved Russia's heavy artillery during the Galician retreat are shown below. The armored cars patrolled the road. This is a British official photograph taken during the retreat in which the squadron did effective work in shielding the heavy Russian guns from capture







A most unusual airplane view of Rheims in France. The cathedral is shown in the center. This cathedral, you will remember, was selected by the Germans as a special target



All airplanes for directing artillery fire are fitted with wireless. A small dynamo connected with a screw is placed in front of the machine and supplies the electric current. This is a French machine fitted with wireless

Save the Food and Help Feed the Fighters

Navy Orders Seaplanes

New Private Aviation School to Aid Volunteers and Contracts Feature Week

Initial Group of Liberty Engines to Be Ready Soon

CHICAGO, Nov. 19—A new private aviation school for the benefit of the young men of the country who wish to enter the Signal Corps but lack the college course required and new Navy plane contracts are features of the week in airplane activity.

The Curtiss Aeroplane & Motor Co. and the Thomas-Morse Aircraft Co. have been given orders by the Navy Department. Curtiss was awarded a contract for nineteen Curtiss H-12 type machines with powerplants, at a total cost of $597,230. The Thomas-Morse Co. will supply six seaplanes with powerplants, at a total cost of $47,000.

The plans of the Lincoln Motors Co. are well under way. Chief difficulty at present is in obtaining the necessary machinery. This has been ordered, and it is believed it will arrive soon, permitting the starting of production on airplane engines within three weeks.

The Government has awarded a contract for the erection of an airplane engine storage house near the Indianapolis speedway to cost about 500,000. Several Indianapolis factories are making airplane engines for the Government.

Liberty Engines

The initial group of Liberty engines will be ready soon. Engines tested up to this time have been produced largely as individual type units by slow hand processes. Now quantity production is expected to start. First deliveries will be comparatively small, but the rate of turnout will be sufficient to care for the requirements of the United States and the Allied nations.

Three companies at Beaver Falls, Pa., making parts for Liberty airplane engines, have been held up temporarily by a strike of 1500 men. They are the Moltrup Steel Co., the Union Drawn Steel Co. and the Standard Steel Gage Co.

A private school will be established at Churchill Downs, Louisville, Ky. Negotiations for the infield of the race course and the necessary buildings have been made by O. F. Darling, a former motor car manufacturer of Dayton, Ohio. But one course of flying will be given before the beginning of the real winter season in the locality. Courses in mechanical tuition may be conducted throughout the winter.

A biplane with a 125 hp. engine will be brought to Louisville for the use of the students. Probably not more than twenty students will be accepted for the initial course to be given. A small model airplane, known as the grasshopper, will be used in primary instruction, to familiarize students with the art of flying. The engine in the elementary machine is one of sufficient power to lift the flying machine but 7 ft. off of the ground. The course can be completed in from four to six weeks.

The purpose of the private aviation school is to enable ambitious young men lacking a college education to learn the flying machine and equip themselves with a pilot's license. Under Government regulations a man without a college education is not acceptable for the Army flying squadron, but anyone holding a pilot's license is eligible, provided the other tests are passed. The instructor will be an Englishman who has had five years' experience in flying airplanes. He has been an instructor in aviation during most of that time.

MARMON PRICES HIGHER DEC. 1

Indianapolis, Ind., Nov. 19—An increase in prices Dec. 1 will be put into effect by Nordyke & Marmon. On that date its closed bodies will be from $450 to $1,100 higher and its open cars $400 higher. The sedan will be raised $450 and will sell at $5,000. The landaulet will be $550 higher and will sell at $4,650; the limousine $450 higher, selling at $4,550. The open cars will sell at $3,550, being raised $400.

DORT CAR PRICES

Prices on the Dort cars were misquoted in the issue of Nov. 18. The sedan is $1,095 instead of $1,065, and the sedanet is $845 instead of $815. These prices have been in effect some time and are not increases.

COLE TO RAISE PRICES

Indianapolis, Ind., Nov. 19—Cole will raise its prices $200 Jan. 1. On that date, the two-passenger roadster will sell at $2,195; the seven-passenger touring car, $2,195; the coupe at $2,695; the 864 sedan at $2,895; the 865 sedan at $2,795; and the 866 sedan at $2,995. Two new sport models will be brought out around show time, a four-passenger and a seven-passenger.

HUPP COSTS $100 MORE

New York, Nov. 16—The Hupp Motor Car Co. has increased its prices $100 on Model N. The two and five-passenger models are $1,485, and the sedan is $1,835.

No Gasoline Curtailment

WASHINGTON, Nov. 16—Fuel Administrator Garfield announced yesterday that motor car owners are not in any danger of having gasoline curtailed and that a survey of the entire country has not shown the oil and gasoline situation to be acute and that for the present no steps would be taken to restrict the use of such fuel for motive power.

The administrator stated that he, however, would inaugurate campaigns to reduce wastefulness of gasoline and to educate car owners how to cut down gasoline consumption. This confirms statements from the capital already published by MOTOR AGE, in which the fear of gasoline restriction was pointed out as needless and gasoline economy as vital to the carrying out of the country's war program.

To Assemble War Trucks

U. S. Refuses Offer of Concern to Handle Knocked-Down Shipments Abroad

Would Operate Own Shops if Plan Were Used

WASHINGTON, D. C., Nov. 16—The new U. S. A. war trucks will not be shipped in knocked-down form abroad and assembled in France, though such a proposal has been made to the Government. The offer was made by Flint & Co., New York, exporters, and turned down by Quartermaster-General Henry J. Sharpe.

The plan contemplated the assembly of the trucks in a plant at Neuilly Sur Seine and the training of drivers at large plants which the Flint company claims to have at its disposal. The offer points out that the shipping displacement of a chassis partly assembled and boxed is 402 cu. ft. whereas under the Flint plan of shipping in knocked-down form a complete chassis would require only 280 cu. ft. The saving of $330,000 on 10,000 trucks, which is offered as an argument in favor of the plan, is based on present shipping rates which are $70 a ton, or $1,600 a chassis. With two weekly sailings of 5000 tons, it would require twenty-five weeks under the present plan to transport all trucks while under the Flint plan this could be done in six weeks. The Flint plan also points out that driveways from factories here will require the service stations en route and assembly and testing plants at the seaboard.

In refusing the offer, General Sharpe stated that if a plan of this character is adopted such work will be done entirely by the Quartermaster Department and in shops operated by it. The offer was considered by H. L. Horning, Major Orton, Christain Girl, General Baker and others. Major Orton has a plan for assembling the trucks and driving part of them over land loaded with parts exceeding the number normally required for repair work in France and using the extra parts for the assembly of trucks in France.

FRIEND LEAVES MITCHELL

Chicago, Nov. 16—Otis C. Friend has resigned as president of Mitchell. He has not announced his future plans. D. C. Durland, for twenty-three years associated with the active management of the General Electric Co., succeeds Mr. Friend as president. R. C. Rueschaw, who resigned as director and sales manager of Reo, has become vice-president of Mitchell.

CHALMERS PERSONNEL COMPLETED

Detroit, Nov. 16—Though the changes in the personnel of Chalmers subsequent to its five-year lease by Maxwell, have been published in MOTOR AGE as they occurred from time to time, the complete list of ex-

How Much Wheat and Meat Are You Saving?

ecutives was not announced until recently. The following are the men who will direct the new Chalmers organization: Walter E. Flanders, president; Carl H. Pelton, assistant to the president; Walter M. Anthony, treasurer; John Flint, comptroller; J. H. Johnson, general auditor; Thomas J. Toner, director of sales, in charge of advertising; C. H. Becker, assistant sales manager; Charles Adams, production manager; E. A. Taylor, general superintendent of factory production; W. K. Swigert, superintendent of production; William Kelly, Engineer; E. J. Miles, engineer; H. M. Jerome, assistant engineer; Roy M. Hood, purchasing agent; Gordon Muir, advertising manager; J. R. Collins, general supervisor of material. Of the above, only four are from the former Chalmers' organization, namely, C. H. Becker, H. W. Miller, W. K. Swigert and H. M. Jerome.

CHANDLER EARNS $25 A SHARE

New York, Nov. 16—The net earnings of the Chandler Motor Car Co. for the ten months ended Nov. 1 amounted to $25 a share. This is after allowing for the year's war taxes of $9.50 a share. The company is out of debt and has $900,000 cash in bank.

F. C. Chandler, president, in his statement to the stockholders, states that the net earnings of the company before war taxes amounted to $32 a share. He estimates that for the completed year, the earnings per share will amount to not less than $34.50 a share. After $13 per share has been paid in dividends this will leave above $12 per share to be placed to the credit of surplus account.

The usual quarterly dividend of $2 regular and $1 extra was declared to-day, rounding out the dividend record for the year. Dividends have totaled $12 per share and an extra for the Red Cross.

NEW SCHEBLER FOR FORDS

Indianapolis, Ind., Nov. 17—The Wheeler & Schebler Co. has placed on the market a new carbureter equipment for Fords which is styled Model A. It sells complete for $17. The new carbureter is a plain tube type with no moving parts and incorporates the principle of the Pitot tube, an improved type of gasoline nozzle which furnishes a rich mixture for starting and a thinned-out mixture for normal running. There are two adjustments, one for slow speed and one for high. The equipment includes the carbureter, steering column control, hot air drum, flexible tubing, manifold gasket and the necessary screws and bolts.

CHARTER OAK DEFUNCT

Hartford, Conn., Nov. 16—W. J. Larkin, Jr., is permanent receiver of Eastern Motors, Inc., New Britain, Conn. This is the concern that intended to build a six-cylinder car to be known as the Charter Oak, the design of Fred A. Law formerly of the Electric Vehicle Co. Motion to sell the assets of the concern was withdrawn, with the explanation that it was expected the creditors would be paid in full. Only one car had been built.

New 6-Hr. Record Set

De Palma in Packard Establishes Mark of 616 Miles at Sheepshead

Twelve Holds All Records from 10 to 600 Miles

NEW YORK, Nov. 16—A new world's record for 6 hr. was established today by de Palma at the Sheepshead Bay speedway, when he covered 616 miles in a Packard Twelve. His actual distance was 633.12 miles, because of the position of the car above the mark set on the track by the American Automobile Association designating 2 miles to each lap. The former record was held by Resta, Chassagne and Guinness, who drove a Sunbeam at Brooklands 566 miles 589 yd., Oct. 1, 1913.

De Palma today averaged officially 102.8 m.p.h. for the 616 miles, his actual average for the 633.12 miles being 105.52 m.p.h. At no time during the record trial did his average fall below 101 m.p.h. His highest official average was 110, covered in the first hr. The speed, excluding 15 min. 20 sec. stops, was 111 m.p.h.

Packard Records

The Packard now holds all records from 10 miles up to 600, regardless of class or free-for-all classifications for cars under 300-cu. in. The car empty weighed 2480 lb. To this may be added the weight of 11 gal. of oil, or 88 lb.; 35 gal. of gasoline, or 227 lb.; 5½ gal. of water, 42; de Palma's weight, 170 lb.; and his mechanic, 135 lb. At 111 m.p.h. the engine was making 3000 r.p.m., neglecting slippage. The engine had traveled 4000 miles before today's test and during the 6 hr. turned over 10,355,500 revolutions.

Gasoline consumption averaged 9 m.p.g., the actual consumption being 67 gal. Eight gallons of oil were taken on. Eight tire changes were made. One right front went 477 miles, when it had to be changed on account of being worn out. Another on the same wheel lasted 52 miles, the tread coming off. Two right rears went at 217 and 234 miles and then were changed on account of wearing out. A left front was changed after it had gone 518 miles because of wearing out. Three left rears were changed on account of wearing out after they had gone respectively 217, 260 and 69 miles.

No stops were made in the first 2 hr. The first stop was made at 228 miles, when two rears and 20 gal. of gasoline were taken on. Two minutes and 29 sec. were lost. No stops were made in the 4th hr. Two rears and a right front were changed at 452 miles, when 20 gal. of gasoline and 5 gal. of oil were taken on. The time out here was 3 min. 57⅗ sec. A left front tire was changed at 520 miles, after the Packard had traveled 4:555:37.2. One minute and 30 sec. was wasted. At the 524th mile, three spark plugs and a left rear tire were changed, losing 6 min. and 3 sec. At 532 miles, 23.8 sec. was used putting on a right front tire. That was the last stop.

The following is the time for each hour:

HR.	ACTUAL M.P.H.	ACTUAL DISTANCE	OFFICIAL M.P.H.	OFFICIAL DISTANCE
1	112.96	.....	110	110
2	112.45	224.91	109.5	219
3	109.85	329.56	106.9	320.9
4	110.14	440.56	107.2	426.8
5	107.14	535.72	104.4	522
6	105.52	633.12	102.8	616

The former records are as follows:

HR.	DISTANCE MILES	YD.	M.P.H.
1	107	672	107.95
2	195	189	97.55
3	287	856	95.83
4	380	628	95.09
5	473	464	94.65
6	566	589	94.39

The equipment consisted of Goodyear No-hook cords, 35 by 5 in the rear and 33 by 5 in front; Delco ignition and generator; Exide battery; Bethlehem plugs; Zenith carbureter; Rudge-Whitworth wheels; and Moto-Meter. Monogram oil was used.

De Palma will try for straightaway mile record at Daytona and probably will take the 300 cu. in. Packard and the 900 cu. in. Packard in which Rader averaged 130 m.p.h. at Sheepshead Bay. The mile record will be gone after in the big car, while the small car will be used for the hour record.

TRUCK DELIVERY ORGANIZED

Cleveland, Ohio, Nov. 16—The Ohio Freight Delivery Co. has been organized to supply trucks to meet the demand for short-distance freight service. Several fleets of trucks have been put into service, and two units have been established for the collection and distribution of freight.

The first of these has branch stations at Cleveland, Elyria, Lorain, Norwalk and Sandusky, the second at Cleveland, Bedford, Ravenna, Akron and Barbeton. Schedules are being distributed giving the rate for each 100 lb. carried between any two points, and the charge is on the basis of mileage. A special price scale is made on shipments of less than two tons made in the mercantile sections of the larger cities. A. C. Thomas is president; W. Hanushek, vice-president; H. L. Schneider, secretary-treasurer; A. Hanushek, general manager; J. F. Ridle, general traffic manager.

PULLMAN PROPERTY RE-AUCTION

Chicago, Nov. 16—The entire property of the defunct Pullman Motor Car Co., York, Pa., excepting the name and good will, is to be sold at auction at the factory, commencing Dec. 4, by Samuel L. Winternitz & Co., Chicago. The entire assets of Pullman were sold at a previous auction, and the property, excepting the name and good will, were obtained by Winternitz, who will resell them. This consists of the real estate, machinery, equipment, parts, merchandise, trucks and finished cars.

1324 OCTOBER CHALMERS CARS

Detroit, Nov. 16—During October, 1324 Chalmers cars were produced, as compared with 759 in September and with 577 in October, 1916.

EDITORIAL PERSPECTIVES

Drivers and Mechanics Needed

CHAUFFEURS and repairmen in service stations and garages now are offered the chance to serve their country in their own line of work and now can offer their services to the Army with the assurance that their talents and experience will be best utilized. Not only that but they will be serving in the most romantic branch of the service. Our air service in France will need nearly 100,000 men to supply the fifty different lines of work connected with it, and they will be needed within the next few months. The aviation section of the Signal Corps is making an urgent appeal for skilled motor car drivers, motorcycle drivers, repairmen and testers to take care of the thousands of airplanes the Government is sending to France to win the war. Practically all of these will be located in the mammoth airdromes behind the lines in France.

THESE men are not to serve as aviators but in keeping the tens of thousands of airplanes in active service over the lines. Many of these will be needed by Dec. 1. They must all be had by March 1. Two-thirds of them will become non-commissioned officers at once, and many later will be commissioned. To facilitate enlistment and make it as easy as possible for you to enlist MOTOR AGE has arranged to assist the Signal Corps by publishing on another page the application blank for enlistment—send it direct to Washington or to MOTOR AGE.

WORKMEN needed will be drawn largely from the motor car industry, but as the motor car factories cannot afford to lose their workmen and keep up their war work, the majority will have to come from garages, repairshops, dealers' organizations and other units in the motor car sales and maintenance end. More drivers or chauffeurs will be needed than any other class. Many thousands of these will be needed to drive the thousands of motor trucks necessary in connection with the airdromes. Trucks are needed to bring in wrecked planes from different parts of the war zone, others to supply gasoline, lubricating oil and similar supplies, and still others are needed to transport airplanes, repair parts, etc., from rail head to airdromes.

YOU who have held back from enlistment because you thought you would be worth more to the country in other lines than in the trenches now have your chance. Make the most of it!

Profit by England's Mistake

ENGLAND now regrets having done the very thing America is contemplating. Reports this week from London indicate that high authorities connected both with the Government and with the motor industry of Great Britain have begun to realize that by the drastic curtailment of motoring and the diversion of the entire motor industry to strictly war work, the Empire as a whole will suffer severely from a commercial standpoint when war is over.

IF Great Britain, whose motor industry was comparatively insignificant in the commercial life of the nation as compared with America's motor industry, which is the third in importance in this country, feels that it has made a mistake by shutting down completely on the production and use of passenger cars how much more will America regret such a step should it be taken? To paralyze America's motor industry would mean many times the damage to America's commercial success after the war.

IT is to be hoped that the authorities at Washington who hold the fate of America's commercial supremacy in their hands and particularly the Bureau of Manufacturing Resources to be formed will be far-sighted enough to see that the agencies which supply all of our industries as well as the motor industry are brought up to 100 per cent efficiency before the third industry of the land is jeopardized not only during the war but for years afterward.

"Carry Your Own—"

THE motorist who is anxious to do his bit will find opportunities in plenty, if he will read the signs in the store windows. For instance, the South Side Grocers' Association here in Chicago is now making a charge of 5 cents for each delivery. This charge is necessary, it says, to meet the Government prices. Thus, the motorist who carries home his own groceries may feel that he is not only saving money but performing a patriotic duty. He is decreasing the steady trickle of pennies and nickles and making it possible for the small retailer to cooperate with the Government more easily in keeping prices low.

THE large department stores also have been advocating the "Carry your own parcels" plan, with great success. They report the effective co-operation of customers with a result of decreased delivery service which in some cases has been cut almost half. The motorist should remember these fewer deliveries mean release of men for active service at the front, as well as economy of time and money. To quote a sign seen in one of the leading stores, "Our government asks you to remember that every package ordered sent which could be carried adds to waste and cost." Motorists, carry your own!

Thanksgiving

AGAIN has come the time of our National Thanksgiving Day. It finds us active participants in the greatest war the world has ever known; it finds many of us with sorrow in our homes, many of us hesitant as to whether we can observe sincerely such a day.

As a Nation we have much to be thankful for. And this is a time when we must think and act as a Nation and not as individuals. Thanksgiving Day this year will be a National Thanksgiving Day in a sense more literal than ever before. Even the Puritans had less reason as a Nation to be thankful than we have today. And yet the First Thanksgiving Day was observed by a people who were teaching a Nation, our Nation, to walk, a people who also were in the midst of public danger, danger that an untried country would reject the first seedlings of DEMOCRACY which they had implanted in the New World.

We should be thankful that, since it was no longer possible for us to remain at peace and retain our National Honor, the spirit of democracy in this country is uniting its forces despite a vast mixture of races to meet the enemy and bring about true and unchangeable peace for all the nations of the world.

We should be thankful that the keenest brains of the Industry have been mobilized to give advice and counsel to the heads of the Government and to offer all or any part of the Industry's resources and output to help make democracy universal.

We should be thankful that the Government is accepting the aid of the Industry as rapidly as the necessary preparations can be made for utilization of the co-operation which motor car, parts and accessory makers are offering.

We should be thankful that we are engaged in a business as vital to the successful carrying on of the world war, which is the business of transportation; that we are engaged in a business identical with other systems of transportation in the value of the assistance it can give to the Government in this hour of need.

We should be thankful that the country has the resources to carry on its part in the great struggle and to give aid and comfort to the Allied nations as well.

We should be thankful for the huge army of men and women throughout the United States who are giving their time and means to the Government that all may be the beneficiaries of democracy.

This war is stupendous. We must win it, and to win is a task as stupendous as is the war. Money, labor, food and guns, though obligatory, cannot suffice. It will take all of us and all we have. And in that measure to which we are able to realize our resources will we be able to utilize them and to bring that much nearer lasting peace and universal democracy. A Nation that gives thanks in this day and time is a Nation that recognizes its own resources. Let this be a National Thanksgiving Day indeed.

U. S. A. Perfects Lighter War Truck

Uses an Internal Gear Rear Axle—Otherwise Is B Chassis Scaled Down

WASHINGTON, Nov. 17—Outwardly the class A military truck differs very little from the larger model except that it has an internal gear rear axle. In other respects it is the class B chassis scaled down to less than two-thirds the weight. Three experimental chassis are to be built, orders for them having been placed today with the Autocar Co., the White Co. and the Denby Motor Truck Co. The scheduled rates for the completion of these vehicles is Dec. 10.

A new record has been set up in the production of the engine which now is being tested in Detroit. Owing to difference in size only a very few parts could be used which were identical with those of the class B engine, so a complete new set of drawings had to be made, new dies cut, new patterns made and so on. From the time this work was started till the engine was turning over in the Continental Motor Co. plant exactly sixteen days and 20 hr. elapsed. The power and especially the torque obtained from the engine enable it to rank with the class B as a highly successful product. At the governed speed of 1200 r.p.m. the power is 42½ hp. and at 900 the torque reaches its maximum of 198 lb.-ft.

Engine 4¼ by 5½

The engine is 4¼ by 5½ in., 312 cu. in., and it differs in design from the class B mainly in having the four cylinders in one block and by having mushroom tappets instead of the roller type. The detachable cylinder heads cover only two cylinders each, thus being exactly like the class B except for size. This division of the head casting into two is excellent practice, because the smaller piece is so much easier to handle when carbon scraping becomes necessary.

The valves are large in proportion to the cylinder bore, being 1⅞ in., measured in the clear across the port, and the timing is as follows:

Exhaust opens 45 deg. early.
Exhaust closes 5 deg. late.
Intake opens 15 deg. late.
Intake closes 38 deg. late.

The valve lift is $\frac{5}{16}$ in. for both the intakes and the exhausts.

The manifold layout is precisely that of the class B, this having proved itself one of the best features of the larger truck. The same is true of all the accessories, ignition, generator, etc., and of the method of mounting in the frame. The crankshaft is 2¼ in. in diameter throughout, has three bearings and is otherwise like the larger job. A slight point of difference due to the block cylinder casting is that the water pump delivers to a single opening instead of to two on the cylinders. Also, the fan bracket is attached to the front of the cylinder block instead of to the crankcase. There is an offset on the connecting rods of ¼ in., this allowing the engine to be shortened. Cooling is varied to suit the smaller engine by cutting down the altitude of the radiator 4½ in., using the same top and bottom cast tanks. The reduced length and height give the front of the truck a very compact look.

The clutch takes the same disks as the class B but has fewer of them, fourteen surfaces as against eighteen. It is inclosed in the same way, and the gear control with the brake lever which is mounted on the bell housing is identical with the class B part. Similarly the transmission looks just like that of class B, only smaller. It has four speeds and is hung in the frame the same way, with a slight difference at the rear. The back end of the aluminum case is machined on a circle like the face of a bell housing, and a steel forged ring is bolted thereto. On this forging are the lugs through which the frame attachment bolts pass and also the anchorage for a transmission brake. This is an extremely clever piece of design because it insures absolute concentricity between the brake and its drum, while no braking stresses can possibly be put upon the transmission case, since they pass directly from the brake shoes to the frame via the steel ring. The brake is a very powerful one, 7 in. diameter and 6 in. wide. It has two external shoes contracted by a cam action, similarly to the brake used on the Riker truck. The shoes are easy to remove for relining and equally easy to adjust for wear. Between transmission and engine is a universal shaft, and this is inclined a little. The transmission is tilted a little to correspond with the object of dividing up the angularity between the two joints in front of the transmission and the two back of it in equal ratio.

It has already been stated that the rear axle is internal gear driven. It is, however, an entirely new design and appears to be one of the neatest. It is not heavy. The brakes are completely protected from lubricant that might escape from the gear and the accessibility of its details is remarkable. The weight-carrying member is a pressed steel "banjo" with steel tubes forced into the ends, very much like the regular Timken passenger car axle. At each end the steel spring tables are attached rigidly, and these carry the driving pinion bearings and the brake anchorage.

Behind the pressed steel case is the differential, this being carried in a steel casting which is inserted from the front of the pressed steel part. This casting holds the bevel pinion and all the bearings. A light cover, removable from the back, incloses the whole assembly. The differential can be removed from the rear without disturbing the bevel pinion, or the whole can be taken out from the front without tearing down the whole axle. After taking off the road wheels the drive shafts can be withdrawn, as they fit into the differential on splines.

Photographs Not Available

It is not easy to explain the way in which grease is kept from the brakes without a photograph of the axle, which is not yet available. The hub is a casting and has bolted to it by the same ring of bolts both the ring gear and the brake drum. The latter is much larger in diameter than the gear and much deeper, so it completely covers the drive. The gearing is inclosed as tightly as possible and is nearer to the wheel than the brake. The drum has its largest diameter right in line with the joint in the gear casing, being smaller on the actual brake surface, and this gives a sort of annular pocket back of the brake which would catch any lubricant exuded from the gear. A ring of holes is drilled to allow escape of any such grease or oil. Any which gets out of the gear will be flung to the largest diameter of the drum by centrifugal action, and hence it will be thrown off outside the brake.

Naturally the gear ratios are a little higher than on the heavier truck. The direct drive is 8.4 to 1, the others are, respectively, 14.3, 32.4 and 42.5 to 1. Tires are 36 by 7 rear and 36 by 4 front.

As on the class B truck, Hotchkiss drive is used, the rear springs being 56 in. long and the front ones 42 in. Both are divided in the center. There is a new system of spring bolt lubrication somewhat simpler than that used on the class B. The spring eye is bushed, the shackles and brackets also are bushed, and instead of the usual spring bolt a piece of steel tube is pushed in, free to turn either in the spring eye or in the shackle. This is prevented from endwise movement by a small bolt which goes right through and clamps the whole together.

On the inner end this bolt secures a plain cap, sealing the end of the tube, but on the outer end the bolt holds up a little oil box. This is a casting with a small reservoir below the level of the spring eye and there is a small splash plate above, the idea being that oil will be thrown up by vibration on to the plate, whence it runs into the spring-supporting tube and so to the bearing surfaces. Overfilling the reser-

Few Class B Changes

WASHINGTON, Nov. 17—A few changes have been made in the Class B military truck as a result of the testing now in progress. The rear wheels are to be 40 in. diameter, to increase the clearance over the brake drums, which will add a tire size to the stock to be carried. This, however, really does not mean another tire to be stocked, because the use of wide single tires would have necessitated a section only good for the rear wheels of class B.

Work is being carried out on a new carbureter which will be special. A small committee of carbureter men have evolved and tried out a design which includes no patented features whatever, and the preliminary results are said to be very good.

For transferring gasoline from the reserve tank under the seat to the dash tank a hand pump is to be fitted.

The design of the ¾-ton truck is proceeding. This will be used by all departments of the Army and also by the postoffice. It is not expected to be ready for some time, as the requirements to be satisfied are so varied. The work, under General Baker's direction, is being handled by H. T. Thomas, chief engineer Reo; B. F. Wright, chief engineer Federal truck; and C. T. Myers, consulting engineer.

voir will flush the whole unit, washing out dirt and old oil. This is the sort of thing that in normal times would be patented and marketed as an accessory and is an excellent example of how several engineers getting together can perfect a detail.

There is little else about the truck which is different from the large one. It has the same equipment, the same fuel feed from a dashboard tank, the same steering, scaled down, of course, the same frame design. It will not have the four-man seat, only two men being carried. The wheelbase, by the way, is 144 in.

The work of the design has been carried out under the direction of General Baker, by B. B. Bachman, chief engineer the Autocar Co.; E. E. Wemp, chief engineer Denby Motor Truck Co.; and A. J. Scaife, chief engineer White Co. For the detail working out of the engine W. A. Frederick, Continental Motors Co., was responsible.

WAR TRUCKS SHOW EFFICIENCY

Washington, Nov. 19—The heavy-duty war trucks, continuing the grinding 24-hr. runs, averaged better than 125 miles daily during last week and attained a record of 3.95 m.p.g. with trucks carrying full rated load and four men on each machine. Since commercial trucks only average this much with full load one day and no load on return and a less number of men, this shows superiority of the new trucks. Up to this time the tests have failed to reveal any important faults and only serve to prove the efficient design and construction. The daily test drives start early each day and continue to midnight. They are made over heavy-going roads by day and better roads by night.

FORD OFFERS FRANCE TRACTORS

Dearborn, Mich., Nov. 16—Henry Ford has offered to supply France with 12,000 Ford tractors after the 6000 now building for England are completed. If this offer is accepted, further delay in placing the tractor on the American market will be necessary. The present English order will keep the plant busy until early in the spring, and if France desires tractors, America will not get them until late summer. Many additions are being made on the plant, and production is increasing.

TAKE $2,262,975 HAPPY FARMERS

LaCrosse, Wis., Nov. 16—Orders for $2,262,975 worth of Happy Farmer tractors were placed at the second annual convention held by the LaCrosse Tractor Co., recently. Distributors covering most of the states from Washington to New England and as far south as Texas and Alabama were present. A feature of the convention was a luncheon attended by the entire factory force, at which the 10 per cent wage bonus to all men who had worked through to Nov. 1, announced last July, was reported paid.

SPEEDWAY MEETING POSTPONED

New York, Nov. 17—The meeting of the Speedway managers called for Nov. 24 by the Contest Board of the American Automobile Association has been postponed, as many of the speedway managers are not prepared to select dates for 1918 at this time.

Industry and Government Together

Active Co-operation of Administration and Automobile Industries Board Begins

WASHINGTON, Nov. 17—Active co-operation of the motor car industry with the Government began this week with the first meeting of the Automobile Industries Committee and the officials of the different departments of the Army and Navy at the War Industries Board, when Chairman A. W. Copland pledged the men, material and equipment of 550 motor car plants and 1080 parts and accessory makers to the war needs. As much of the vast production facilities of the motor car industry as may be needed by the Government will be devoted to war work.

Close co-ordination of the Government's war requirements with the Nation's industrial facilities will be developed by the Council of National Defense through the formation of a Bureau of Manufacturing Resources, the personnel of which will be announced soon. The bureau plans indicate the council is taking considerable precaution to guard against all economic unrest and upheaval in calling on American industries for war service.

The plans include the bureau as a part of the War Industries Board and will deal with the situation arising when manufacturers who have facilities are asked to place their productive capacities at the Government's disposal or to turn a part of their facilities to war work. The bureau will attempt to distribute such work so there will be a minimum of unsettlement in any one industry.

The council will make no arbitrary classification of any industry as an essential or non-essential, but will allow the question of curtailment to be decided by the available supply of raw materials, fuel and transportation facilities.

Danger to Characterization

To characterize any industry as non-essential, it was pointed out, might foster unfair public opinion against a legitimate trade. When the demands of the Army and Navy conflict with industry it is expected that industry will have to give way, but it is expected that the co-operation with the Government will be given by all and that the new Manufacturing Resources Bureau will be able to apportion war contracts to those factories having an idle capacity rather than to those whose business is at full capacity.

The newly appointed Highways Transport Committee will not operate any motor transportation but rather, through constant investigation of existing conditions and through co-operation with other transportation agencies, will attempt to inaugurate to the fullest extent the possibilities of the motor truck for carrying freight over distances where it can display its economy and helpfulness in the present emergency.

General Chauncey B. Baker of the Quartermaster Corps in charge of Army transportation has requested the committee to have the highway between Detroit and Newport News placed in the best possible shape soon for a run to be made by a quartermaster motor truck train. This trip will be preliminary to determining the feasibility of bringing the thousands of new standardized heavy duty war trucks over the highways of the country early in 1918, when these trucks will begin to leave the assembly factories en route for France.

The first trip will be made by a regular truck company of thirty trucks with the full army personnel. The men will encamp each night at whatever spot the train finds itself at the end of the day's run.

Roy D. Chapin, chairman, has arranged to live permanently in Washington for the duration of this work and is for the time being placing the direction of the Hudson, of which he is president, entirely in the hands of other officials of the company.

Priority Order Continues

The Priority Board order forbidding use of open top freight cars for passenger car shipment is still in force and despite vigorous protests from many sources apparently will continue as an active order for an indefinite period. Matters regarding the steel shortage which has been claimed by the War Industries Board are adjusted temporarily to the satisfaction of all parties by the organization of the official motor car industry committee and the outlining of the duties of the director of steel products by the War Industries Board. The industry committee at once will begin analysis of conditions in the motor car industry, and transmit these findings to H. L. Horning, who is accredited representative on automotive matter, and who in turn will take them up officially with the War Industries Board and J. F. Replogle, director of steel products.

Another serious problem, aside from fuel and steel, remains in the labor question. Shipbuilding firms and others engaged in mechanical war work are casting envious eyes upon the cabinet makers and skilled mechanics of the motor car industry. Cabinet makers are required for airplane work; skilled mechanics are needed in ship-building plants, and it will only be a matter of time when some means of transferring skilled workers from one plant to another will be necessary. This is a problem that will merit investigation into the methods used in England, where a scheme for transfer of skilled labor has been operated for some time and where labor exchanges conducted by the government educate workers as to the requirements of other plants and arrange for equal or slightly increased compensation and the cost of moving where the workers are willing to be transferred. The English plan also considers the labor-turnover, that problem that is now so costly to American employers, and undertakes to reduce it by giving workers who with just cause quit their work what is called an honorable discharge, which entitles them to immediate work at any plant requiring labor. A worker without an honorable discharge cannot obtain a new position for six weeks afterward.

Opportunity Waits in Signal Corps

For Men Skilled in One of Fifty Lines

IF a miracle fairy suddenly arose before you and offered you wealth, health, adventure, experience—told you of a new industry, a year ago small, now rapidly growing, ten years hence one of the greatest on earth—and gave you the opportunity to learn that business now, to gain practical knowledge and experience in it and combine also journeys to foreign lands, would you grasp the opportunity? Would you leap at the chance to open the door to life's greatest adventure and richest offerings? Of course you would, and so would every man who knows the spark of ambition.

The Signal Corps of the National Army is the miracle fairy. It is the mine of education, adventure, experience, health and wealth. It offers:

Health—Open door life,
wholesome food,
steady habits,
training.

Education—Camp instruction,
field instruction.

Experience—Airplane repair,
truck repair,
passenger car repair,
airplane engine testing,
passenger car driving,
truck driving,
airplane mechanics.

Travel—Special camp in U. S. A.,
field service in France,
sight-seeing tour of Berlin (later).

Adventure—Life close to rear trenches,
within sound of battle
part of great air service
in thick of army backbone.

Wealth—Airplanes will be future messengers, carriers, mail deliverers. Thousands of them will be needed—and mechanics, executives and engineers EXPERIENCED in airplane work will be in demand.

FROM 60,000 to 100,000 men to supply fifty different lines of work connected with our air service in France will be needed in the next few months by the aviation section of the Signal Corps. These will be needed to take care of the thousands of airplanes the Government is sending to France to take part in the war. Practically all these workmen will be located in the large airdromes that are to be located as near back of the lines as possible in France.

Many of these men will be needed by December 1 of this year and should be enlisted on or before that date. Others will be required from month to month until March 1, when it is hoped the great majority of recruiting for this service will be accomplished. These men are not to serve as aviators but in the fifty different trade lines necessary to keep tens of thousands of airplanes in active service in the war zone.

All these skilled workmen will be given the rank of sergeant or corporal, and quite a few will be ranked as commissioned officers. The class of men needed for this aviation work ranges from chauffeurs, who will be needed to drive motor trucks and passenger cars in this aviation service, to expert engine testers, magneto repairmen, welders, machinists, tool makers, pattern makers, as well as experts for keeping motorcycles in repair.

All applicants for enlistment must be eighteen years of age or older but not over forty and must be white, physically sound and competent in the trade followed. These men must first enlist as privates and immediately after enlistment will be put through a training course in a large camp somewhere in America where climatic conditions are favorable for winter training.

It is an honor to belong to the Signal Corps. Only healthy, intelligent, earnest, skilled workers are taken. And the Signal Corps is the division that is looked to for victory over the enemy.

If you are white, and not over forty, physically fit and skilled in trade as chauffeur, motor car mechanic or repairman, motorcycle repairman, engine tester, propeller tester, vulcanizer, motorcyclist, you are eligible to the opportunities of the Signal Corps. The air fighters must be backed up by men skilled in these and other trades, ready for instant and constant service, able to repair an engine, bring up supplies, construct and maintain the airdomes, drive trucks and passenger cars in field service, and it must have men who as:

Mechanics will act much like the racing mechanicians at the pits, ready to inspect and overhaul an engine, change parts, straighten twisted rods and plates and do all sorts of skilled mechanical work.

Chauffeurs will bring up from the bases new equipment and supplies to replace those destroyed, food and ammunition, besides carrying field officers about in passenger cars.

Motor car repair men will care for the heart of the airplane, its engine, and see that nothing will happen to its in mid-air, tighten bearings, put in new parts, and, if in the main repair shops, rebuild engines from the ground up.

Motor car engine testers will test airplane engines before each flight, a most important work—the job of seeing that the airplane will not balk in mid-air.

Propeller makers and testers will operate while traveling in airplanes in high speed—work requiring specialized skill.

Motorcyclists will carry important communications and small but important supplies.

Vulcanizers will care for the pneumatic tires that must be in good order to allow the airplane to "taxi" along the ground when it lands.

In addition to the wonderful opportunities already mentioned all skilled workers are assured of positions as non-commissioned officers. Everyone receives the rank of corporal or sergeant with pay ranging from above $30 to $62.50 monthly and all clothing, food, transportation and so forth. And every officer, placed in charge of

These Are the Men Needed

Chauffeurs
Motor car mechanics
Engine repairmen
Office clerks
Carpenters
Radio operators
Electricians
Instrument repairmen
Cooks
Coppersmiths
Armorers, machine gun (repairman)
Sailmakers
Photographers
Machinists
Blacksmiths
Motorcycle repairmen
Stenographers
Cabinet makers
Draftsmen, mechanical
Magneto repairmen
Metal workers
Motor car engine testers
Rope riggers
Propeller makers, airplane
Riggers, airplane assemblers
Telephone linemen
Toolmakers
Vulcanizers
Welders
Lithographers
Packers
Motorcyclists
Telephone operators
Plumbers
Painters
Tailors
Gas work employees
Buglers
Moulders
Pattern makers
Telephone adjusters
Barbers
Truck masters
Bricklayers
Cobblers
Propeller testers (airplane)
Boatmakers
Saddlers

Aviation Enlistment Blank

Just fill in, cut off and mail this application

Volunteer Bureau, 119 D Street, N. E., Washington, D. C.

I desire to enlist, as a skilled workman, in the Aviation Section of the Signal Corps.

Name .....

Address .....

At present employed with.....

Trade.....**No. years in trade**.....

If you will be called by draft, when?.....

.....

If you are not a skilled worker, go direct to any Army Recruiting Station and enlist anyhow as a private in the Aviation Section of the Signal Corps. Good men of any sort are needed, and good men soon find their proper level.—MOTOR AGE.

Save the Food and Help Feed the Fighters

squadrons has also the opportunity to become a truckmaster in charge of fleets carrying the supplies from bases to the airdomes.

The Signal Corps needs from 60,000 to 100,000 men. It must have skilled men. It offers everything. And you have here the chance to serve your country with your best knowledge in a most important branch of the service with a minimum of physical danger.

With this article we print the enlistment blank. It is simple. Anyone can understand it and fill it out. After he enlists, which everyone, of course, must do as a private, the recruit is placed in a comfortable large camp somewhere in the United States, where climatic conditions are favorable and where he is taught additional information and practice in his particular trade. He receives a minimum of military training—no trench digging—only the kind that teaches military discipline and builds health. He receives pay from the day his enlistment is approved.

Sooner or later you must say "It's up to me" and you'll join the service. Here is your opportunity with bountiful opportunity in return—your chance to serve at your best. The manufacturing part of the industry cannot spare the men. The dealer and garage and repair divisions must. Sign the blank—do it today—tell your children you were among the first to go. Wealth—health—education—travel — experience—training—what more can any man ask.

INDUSTRY HELPS Y. M. C. A.

Detroit, Nov. 16—In the Y. M. C. A. campaign here this week, Henry Ford's contribution is one of the largest to date, just as it was in the case of the Liberty Loan. Henry Ford personally gave $25,000 and Edsel Ford $3,000. Other manufacturers gave the following amounts: Timken Detroit Axle Co., $5,000; Detroit Copper & Brass Co., $3,500; Michigan Copper & Brass Co. and the Michigan Malleable Iron Co., $1,000 each.

WAGNER GETS WAR ORDER

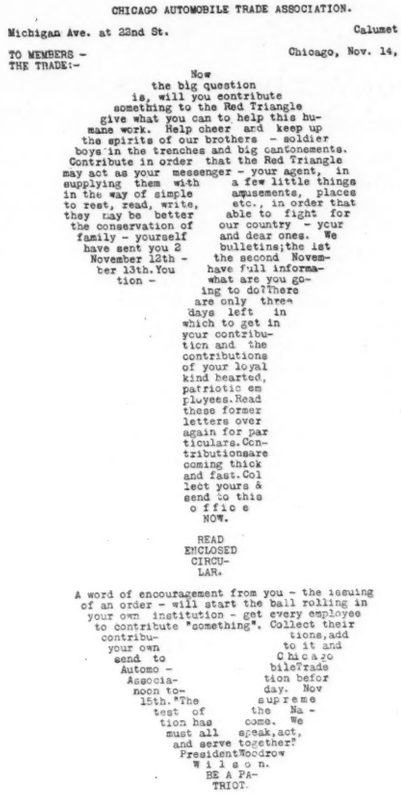
Indianapolis, Ind., Nov. 17—The Wagner Axle Co., Anderson, Ind., has been awarded a contract by the Government to manufacture axles for the U. S. A. war trucks. A force of 250 men now at work will be increased to 500 men by the first of the year, when the company expects to be turning out 1000 axles a month. The company's manufacturing space is to be enlarged immediately.

WOULD INCREASE EFFICIENCY

Washington, Nov. 17—Henry Ford believes the war problems, including fuel shortage, freight car shortage and so forth, can be handled to better advantage than present plans indicate and is interested especially in the coal situation, which he states can be improved by utilization of better production methods rather than by curtailment of manufacture of certain products.

The steel industry should be 120 per cent efficient for war power, according to Mr. Ford. Instead of curtailing industries to meet a situation caused by coal shortage the problem should be solved by increasing the coal production.

It is pointed out as an example that a factory in Ohio making steel for motor cars was asked to undertake airplane work. It accepted but pointed out that some arrangement should be made for handling the steel billets for motor cars and suggested that it first complete them. The Government refused and ordered immediate work on the airplane contract and suggested that the billets be shipped to Cleveland to another plant. But the Government order prohibiting use of open-top freight cars for such shipments interfered and the company was obliged to hold up the shipment, so that it was unable to work on the billets, unable to start on the airplane because of the billets and unable to remove the billets. After considerable difficulty it improvised box cars out of flat cars and after much loss of time succeeded in getting the billets on their way.



CHICAGO AUTOMOBILE TRADE ASSOCIATION.

Michigan Ave. at 22nd St. Calumet 6046.

Chicago, Nov. 14, 1917.

TO MEMBERS - THE TRADE:-

Now the big question is, will you contribute something to the Red Triangle give what you can to help this humane work. Help cheer and keep up the spirits of our brothers - soldier boys in the trenches and big cantonements. Contribute in order that the Red Triangle may act as your messenger - your agent, in supplying them with a few little things in the way of simple amusements, places to rest, read, write, etc., in order that they may be better able to fight for the conservation of our country - your family - yourself and dear ones. We have sent you 2 bulletins; the 1st November 12th - the second November 13th. You have full information - what are you going to do? There are only three days left in which to get in your contribution and the contributions of your loyal kind hearted, patriotic employees. Read these former letters over again for particulars. Contributions are coming thick and fast. Collect yours & send to this office NOW.

READ ENCLOSED CIRCULAR.

A word of encouragement from you - the issuing of an order - will start the ball rolling in your own institution - get every employee to contribute "something". Collect their contributions, add your own to it and send to Chicago Automobile Trade Association before noon today. Nov 15th. The supreme test of the Nation has come. We must all speak, act, and serve together! President Woodrow Wilson.

BE A PATRIOT.

The Chicago Automobile Trade Association helped the Y. M. C. A. campaign by this letter

Use That Spare Seat

JOHN N. WILLYS, chairman of the National War Camp Recreation Committee, announced estimated pledges and contributions of approximately $2,000,000 on the second day of the campaign for a minimum of $3,700,000 for recreation work in cantonments here and abroad. Are you one of those who are making this fund grow?

Indications are that Chicago residents will prepare places in their Thanksgiving Day for more jackies than are at the Great Lakes Naval Training Station. Many of them will spend the day motoring about Chicago's wonderful boulevard system. Perhaps this will give you an idea of what you can do for the soldiers and sailors. Here is how—

Call up your local headquarters of the State Council of Defense or the Y. M. C. A., or the headquarters of the War Camp Recreation Committee, if there is one in your town. Tell them you want to take one, two or three sailors or soldiers out for a ride. They will arrange it.

If you can't spare the time or are too far from a camp—

"Three Dollars for Each Soldier" will cover the whole cost of one year of bringing the whole activities of the War Camp Recreation Committee into play.

Motor Age will receive subscriptions for the War Camp Recreation Fund and will see that they are forwarded to the proper place. Address War Camp Recreation Dept.

ENGLISH TAXI'S FIRST INCREASE

London, England, Nov. 2—It has required over three years of war to bring about an increase in taxicab rates in London and in spite of gasoline selling at $1 per Imperial gallon the pre-war rate of 15 cents per mile has generally ruled until Nov. 1, this year, when a charge of 12 cents per trip was authorized.

Some sections of Greater London have refused to allow any increase in taxicab fares because of the higher price of gasoline and have recommended that taxis use coal gas because of the very expensive gasoline.

An innovation in connection with the use of coal gas for operating motor trucks and motor cars is the establishing in parts of London of a municipal coal gas station for general use of cars and which corresponds with our curbside gasoline stations in America.

G. M. C. BUILDS AMBULANCES

Pontiac, Mich., Nov. 16—The G. M. C. truck factory here is concentrating on the construction of war ambulances and to date has produced nearly 4000. To care for this work two additions have been made to the factory and the capacity is eighty trucks a day. The trucks are mounted on the standard 1-ton chassis, and there are orders on hand for about 2000 more. At the same time, tractors for the aviation service are being built. These trucks are driven by the regular 2-ton engine mounted on the 1-ton chassis and equipped with 1- and 1½-ton axles, being designed to carry airplane bodies and to tow a trailer on which the wings are carried. About 1700 of these trucks will be built.

TO OPEN CAPITAL OFFICES

Washington, Nov. 15—The Motor Accessories Manufacturers and the National Automobile Chamber of Commerce will open and maintain joint offices in Washington during the war to establish points of contact between the industry and its official committee and other committees.

Confidence in Future Not Lacking

All That Is Necessary to Clarify Situation Is Statement from Washington as to What Is Needed from Automotive Industry and When Wanted

DETROIT, Nov. 19—What the motor car industry wants from Washington more than anything else is a good clean-cut business proposition. It wants to know what the Government wants and when it is wanted. This comes first, and if the Government requires 100 per cent of the motor car plants to carry out its wishes, that 100 per cent is at the Government's disposition. If the Government requires 90 per cent, 50 per cent or 40 per cent, it makes no difference in the alacrity with which the manufacturers in the industry will comply with the wishes of Washington. If the Government wants to place an order for $5,000,000,000 worth of munitions with the industry, and gives it the time in which that quantity is to be delivered, the industry will adjust itself to that order and will let everything else go to keep deliveries on that order up to the times specified by the Government.

Most Adaptable Industry

The industry is probably the most adaptable industry in the world. It is adaptable because it is young; it has acquired no fixed habits. It has been compelled to change rapidly almost from year to year to keep its product up to time. It had to continue production during building and during all sorts of unset conditions and has had in many ways an opportunity to show its adaptability.

Even now in times when a shortsighted policy threatened for a time to ruin one of the greatest assets of the country, the industry has gone ahead, filling its program to as large an extent as possible and awaiting as best it may, and it must be confessed with some anxiety, the actions of Washington.

To-day the situation is clearing. In spite of rumors which find their birthplace in the financial and speculative centers of the country rather than in the industrial and production centers, plants that would otherwise have remained stable are not shutting down. The disposition to put the industry out of business seems to be passing with a clearer understanding of the facts. The paralyzing of internal commerce is not a war measure and none of the executives in big positions in the motor car factories has ever really felt that the great economic mistake mentioned by Howard Coffin would ever really be made.

Statements made to representatives of the Class Journal papers during the week by such men as C. A. Earl of the Willys-Overland Co., Henry Ford, R. H. Collins of the Cadillac Motor Car Co., E. VerLinden of the Olds Motor Works and other executives of such companies as Reo, Hudson, Buick and Oakland cannot help but give the impression that all that is wanted to clear the atmosphere immediately in the industry is a clean-cut proposition from the Government.

It is far better for the Government, according to the consensus of these men, to come to the industry with a statement of what it wants rather than an estimate of the amount of production which will have to be cut off the 100 per cent capacity to fit the requirements of munition manufacture. It would be far more satisfactory to the motor car industry and doubtless to the Government also if it could clearly state just exactly what it wants from the industry and when it wanted delivery on these war products. The committee of three could then readily divide up this war work among the factories in the industry and could divide it up in such a way that the factories secured what is most suitable for them.

Doubt and uncertainty are damaging; they mean delays in the carrying out of the Government's desires in the matter of munitions, and it presents a detriment to an important industry. When a concern does not know what it may be able to do a week hence, it cannot provide measures for the future. This is a bad economic condition which would help ruin any business, so that a crystallized word from Washington would be of the greatest benefit to the entire situation.

The efficiency of a nation is dependent upon the efficiency of the individuals which compose it, and the efficiency of these individuals is no greater than the efficiency of the transport systems which convey them from place to place. The less delay in transport the greater the productivity of any individual. To curtail the use of motor cars which transport men from place to place is no worse than the curtailment of the use of telephones which transport thought and speech from one point to another.

One of the greatest detriments to a clear understanding of the situation is the rumor crop. Last week, in and around New York, reports were circulated that factories were closing down and laying off men in and about the Middle West. As a matter of fact, one factory was closed for a week for its annual inventory period and bright and early this Monday morning has started to work again full blast. One company which was reported to be about ready to close its doors has been shipping 105 cars a day for the last two months, and unless some unforeseen circumstance should arise will ship more than this for the next two months.

All Bought Cars Needed

Nobody buys cars in these war times unless they need them, and yet Cadillac is shipping at the rate of 3000 a month, the Overland company about 300 a day, Ford nearly 3000 a day, and other factories in accordance with their output capacity. In spite of all the pessimism in the speculative centers of the country, particularly in the vicinity of Wall Street, business is excellent in many parts of the country. People in these sections who have always needed cars but have not been able to afford them before now, are buying cars. Throughout the cotton centers this is particularly true. Business is so good through certain sections of the South that used car dealers are buying up cars and shipping them to points through the cotton belt where they are being disposed of quickly at good prices. We know of instances where people wanting to dispose of used cars have sold them at prices high enough in the South not only to pay the freight but to command a margin of 5 to 10 per cent higher profit than would be possible in the particular section of the country where the cars were shipped from.

Oakland is producing from 150 to 175 cars a day, Monroe making from fifteen to twenty cars a day, and concerns in the ten-a-day class, such as, for example, Jordan, are having the largest day shipments in their history right now. This concern shipped twenty-three cars Nov. 2, its normal output being ten a day.

People are buying cars because they need them, and when they buy cars they are supporting people who are engaged in a business just as necessary to the welfare of the nation as manufacturers of telephone equipment, trolley cars, railway

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MAKERS CONSIDER WAR WORK

Detroit, Nov. 19—During the last three weeks more than 200 Detroit manufacturing concerns have inspected specifications for bids on war materials and in most cases bids have been submitted. Of these several were manufacturers of motor cars and kindred products, though not in many cases were the bids accepted. The reason for this doubtless is that few of them were for quantity orders so that it would be worth while to take over the contracts. J. H. Cullen, industrial secretary of the Detroit Board of Commerce, is in Washington conferring with the purchasing departments of the various bureaus determining how orders may be apportioned among the Detroit manufacturers.

One of the problems facing manufacturers of war contracts here is in obtaining storage space for the war material. A resolution was passed at a special meeting of the manufacturers to ask the Government to provide a warehouse for all munitions manufactured. The goods will be placed here and a receipt obtained after which the manufacturer may receive his money from Washington. This step is deemed necessary in view of the fact that transportation difficulties are liable to increase during the winter so that the goods may not be readily moved and because many concerns require immediate capital for continuing their work. This resolution will be forwarded to Washington at an early date.

How Much Wheat and Meat Are You Saving?

cars, locomotives, motor trucks and all other forms of conveyance regardless of whether they be intended for merchandise, human beings or the speech which human beings utter.

The motor car industry does not stand by itself. It represents what might be called the head on a body which is composed of rolling mills, copper and brass works, upholstery, artificial leather, paints and varnish, rubber, fabrics, foundries and hundreds of other pursuits. When the motor car industry is called non-essential, all these other industries are called non-essential along with it.

79,675 FORDS IN OCTOBER

Detroit, Nov. 16—In October the Ford Motor Co. manufactured 79,675 cars, bringing the total for the last six months to 469,135. At this rate, the yearly production will be 938,270 cars, though the estimated production is 900,000. Unless war conditions prevent, the production for the current fiscal year which runs from Aug. 1, 1917, to Aug. 1, 1918, will be 1,000,000 cars. Demand is constantly ahead of production, and since the first of last August the company has never been less than 100,000 cars behind orders for immediate delivery.

WILLARD HEADS WAR BOARD

Washington, D. C., Nov. 20—Special telegram—Daniel Willard, president Baltimore & Ohio, is appointed chairman of the War Industries Board and B. F. Hore, director International Harvester Co., has been appointed civilian member of the aircraft board.

STUDEBAKER BRANCHES

South Bend, Ind., Nov. 19—Studebaker Co., Inc., has taken over the distribution of Studebaker cars throughout Ohio and lower Michigan by establishing three branches, one at Toledo, one at Dayton and one at Cincinnati.

Mid-West Trade Steady

Retail Sales Much Better Than in the East and Unusually Strong in South

No Widespread Laying Off of Men as Rumored

CHICAGO, Nov. 19—Trade conditions in this territory have undergone no changes of importance during the last week. Sales and prospects of sales as a whole in the passenger car field, while not as good as could be wished, are as good as could be expected. This is the general opinion of the industry around Chicago and Indianapolis and other manufacturing centers.

Retail sales in the West and Central West are much better than in the East, and in the South sales are unusually strong. The country over, however, according to factory report, is seriously behind in retail orders. Retailers are not stocking up as they have in previous years. Bankers are tightening up on loans to retailers, insisting that both new and second-hand stocks be moved before money is borrowed for further purchases.

Closed cars are not moving as rapidly as they should. With some of the big body builders devoting their plants to aircraft production and other work, there should be a shortage of closed car bodies "under normal conditions," but there are plenty of bodies to meet the demand.

There is no widespread laying off of men as was rumored would take place. One Indianapolis concern, in particular, is producing more cars than it ever produced before and is way behind its orders.

A. R. Erskine, president of Studebaker, states that the company believes the volume of Government orders handled by the plants of the industry during 1918 will not exceed 30 or 40 per cent of their maximum capacity and that the production of cars will be curtailed only to this extent and that the output of cars will thus be large enough to insure a large volume of business for dealers and with conservative curtailment of expenses it should have a prosperous year.

The present uncertainty in the industry as to what the Government may do toward curtailing production of cars has caused a decided unrest among dealers. This uneasiness comes from the fact that they have no means of knowing whether they will be able to get cars for distribution during the coming season. The Mitchell sales organization is dispelling any doubts on the part of its dealers by urging that even should passenger car production be curtailed seriously by Federal authorities, there will be plenty of work for them to do and even if all factories would have to close up, dealers can keep going until after the war through service on the five-million cars now in the country, and by handling accessories for these cars. In addition to this it might also be pointed out that with 5,000,000 of any commodity in use there is certain to be a great deal of buying and selling in it, even though it should be such a commodity as used cars.

New York Situation

New York, Nov. 17—Business conditions appear quite satisfactory to New York dealers. The stock of used cars on hand is normal for this time of year, but even where more than usual are being held, the dealers are not worried.

Practically all dealers are having difficulty in getting shipments of new cars, and in this field, too, there is quite a general attempt for dealers to get as many new

The Personnel of the Automobile Industries Committee

M. A. M. Representative
A. W. Copland (Chairman)
Detroit Gear Co.

N. A. C. C. Representative
Hugh Chalmers
Chalmers Motor Co.

John R. Lee
Ford Motor Co.

Save the Food and Help Feed the Fighters

cars as possible and store them. For example, one dealer expects to receive 1000 cars, which will be stored for the spring. Dealers figure that it will pay them well to buy storage space for this purpose.

Among the dealers in higher-priced cars the sentiment is fairly general that the number of sales shows a normal increase over October of last year but that the amount of money taken in is less. In other words special jobs are not selling nearly as freely as they would under normal conditions.

There is an excellent demand for sedans and several dealers report inability to get enough to fill orders. The demand for chauffeur-driven inclosed cars also is good.

In general, there is a certain uneasiness regarding the future and several dealers are quite frank in their statements that they are looking about for establishments not far distant from Broadway but where the rental will be considerably less.

Kansas City Zone

Kansas City, Mo., Nov. 17—Within the last five days business in this territory has returned to near normal after fifteen days of what was termed a bad slump. The dealers are optimistic that something like normal conditions will prevail during November and December, at least for cars selling at less than $2,000. Restriction rumors have had glancing effects on the dealers in the Kansas City zone and are not as far-fetched or as prevalent as in the East.

Liberty Bond subscriptions are given by the dealers generally as reasons for the slump in business during the fifteen-day period. The section has had exceptionally good weather, and this with propaganda to allay restriction rumors has helped bring both wholesale and retail conditions nearer normal. The farmers have more money than ever before. One concern reports 500 cars behind on delivery. Another reports twenty-five more cars sold in September this year than in any previous September and says it will sell thirty more this November than in any previous November.

Truck Test a Success

Transportation of Soldiers and Equipment Over Highway Saves $2.84 per Man

Record of Five 2-Tonners Shows Military Value

IF a motor truck carrying eighteen soldiers and their full marching equipment, representing a load of more than 2 tons can beat special train time, in addition to saving $2.84 per man on transportation charges, no additional argument should be needed as to the value of constructing military highways between strategic points. This record was made in the military motor truck test between Fort McPherson near Atlanta and Fort Oglethorpe near Chattanooga over the Dixie highway, Tuesday, Oct. 30, according to data compiled on the test by Lieutenant-Colonel H. J. Gallagher, depot quartermaster at Atlanta. The time over the Dalton route was 5 hr., a distance of 124 miles. The time of the White truck with the special body designed by Colonel Gallagher for the transportation of infantry soldiers and their full marching equipment was 5 hr. and 32 min. for 135 miles.

The exact figures of the performance of the transport truck as reported by A. G. Seanor, southern sales manager of White, who drove the truck follow:

Tuesday—Tires, Goodrich, Silvertown and De Luxe; road conditions, generally fair; distance going from Five Points to Fort Oglethorpe via Rome, Ga., 132-6 miles; actual running time, 5 hr. 33 min. average 24 m.p.h.; gasoline consumption, 24 gal., $6.24; oil consumption, 4 gal., $2.40; depreciation, tires, $5.27; truck, $4.51; total cost, $18.72; cost per man, $1.04; cost per man per mile, $00.74.

Wednesday—(Returning via Dalton)—Road conditions, fair; weather fair; miles covered, 125.7; actual running time, 5 hr.; average speed, 25 m.p.h.; gasoline consumption, 21 gal., $5.46; oil consumption, 3 gal., $1.80; depreciation tires, $5.28; truck, $4.27; total cost, $16.81; cost per man on return, $0.934; cost per man per mile, $0.0074.

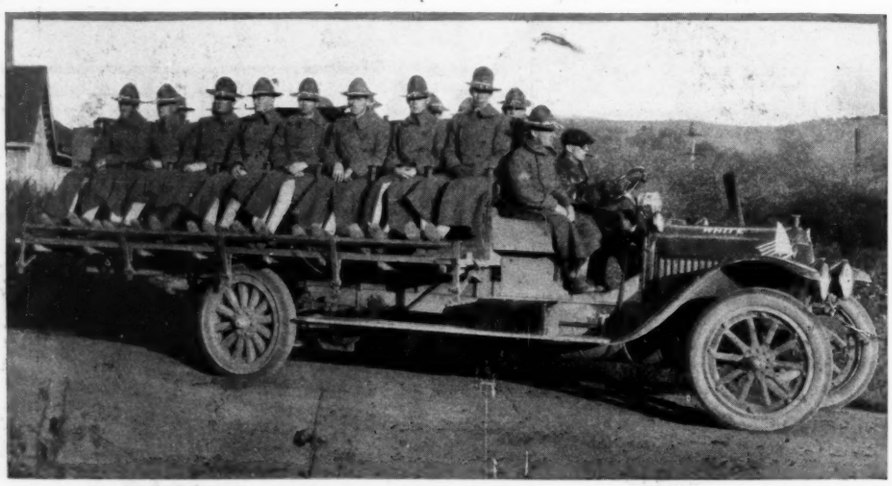
The record made by five 2-ton trucks used in the transportation of clothing and hardware from the big warehouse of the depot quartermaster at Atlanta to the regular army encampment at Fort Oglethorpe on the same date gave further evidence of the value of highways for military use. The record of an average of 9 hr., incidentally pointed out to the civilian shipper that highways available for motor truck use for similar distances, offers a solution of the car shortage problem. The cost of handling the shipment of Government supplies averaged $7.97 per ton as against $9.59 per ton in less than carload shipments by rail. From 12 to 35 hr. was saved in time of delivery of these shipments.

Were the Dixie highway between Nashville and Chattanooga as near completion as the highway from Chattanooga to Atlanta, it would be possible to make deliveries of manufactured articles and supplies furnished by the northern centers into the South by motor truck at a small additional expense over that by rail. In view of the congestion of freight in the North and East, and the embargo which has been placed on all kinds of shipments excepting war supplies and perishables, the saving in time on shipments would run into weeks and months.

The military supplies for the truck test were furnished through the co-operation of Lieutenant-Colonel Gallagher, depot quartermaster, and his assistant, Lieutenant-Colonel R. B. Powers. The test was under the direction of Major A. L. Bump of Fort Oglethorpe. Major Bump detailed Sergeant O. M. Thomas, who holds the record for long service in the transportation department of the Army, to be in immediate charge of the trucks.

Col. T. A. Pearce of Camp Gordon, Atlanta, was detailed by the War Department to observe the test and its results and make an exhaustive report to the Government. Among the military observers were Colonel Pickering, Major Bump, Major Gordon Catts, assistant senior instructor of the Officers' Reserve Training Camp, Captain A. T. Dalton, construction quartermaster at Fort Oglethorpe, Captain Hodges of the Quartermaster's Department, Lieutenant-Colonels Gallagher and Powers and Captains Anderson and Seals of the Quartermaster's Depot, Atlanta, and Captain Pierre Loriot of the French army to the training staff of Col. H. J. Slocum at Fort Oglethorpe.

Two Indiana trucks, two United States trucks, two Superior trucks, the White with the Gallagher body, and a Reo for the observers' baggage were used on the test.



The White truck with Gallagher body, that transported the eighteen soldiers and their equipment between Fort McPherson and Fort Oglethorpe in a test to show efficiency of truck transportation

CONSIDER BANKHEAD HIGHWAY

Washington, Nov. 17—Senator John H. Bankhead, chairman of the Senate committee on postoffices and post roads, discussing the recent road trip over the Washington-Atlanta leg of the Bankhead highway, predicts that if the present partnership between the Government and the several states produces real roads that will weld the country together, it will be possible at the expiration of the five-year pe-

How Much Wheat and Meat Are You Saving?

riod, during which the $75,000,000 is to be expended, to obtain a yearly appropriation of from $50,000,000 to $100,000,000.

Between Washington and Atlanta are two contesting routes in Virginia; one via Richmond and Petersburg, and the other over the Piedmont route, which includes Danville, Lynchburg, Charlottesville, and Culpeper. A committee, consisting of John Oliver LaGorce, chairman, of the National Geographic Magazine; M. O. Eldridge of the U. S. Office of Roads and Rural Engineering; and Executive Chairman A. G. Batchelder of the American Automobile Association, will pass upon the merits of the two Virginia routes.

HEADLAMP LAWS IN CHAOS

New York, Nov. 16—That headlamp laws are in a state of hopeless chaos and mainly quite useless was agreed by representatives of seven Eastern states who met in New York yesterday. The question was discussed with the members of the headlamp division of the S. A. E. standards committee, who were asked to suggest how a law might be made effective. The legislative representatives were shown that the most effective regulation was that of height of light beam commonly called the 42-in. rule and that it is quite easy to apply this law by the use of very simple apparatus.

The greatest difficulty found in the states where the 42-in. rule is applied is in explaining it to users of cars. There seems to be a prevalent idea that there is something mysterious about it, while it only means tilting the lamp slightly downward and focusing the bulb properly to give a good beam. To set lamps the necessaries are a flat surface 75 ft. long and a wall across the end of it. Along the wall, 42 in. from the ground, a white line about 6 in. wide should be painted. Then, by placing the car squarely opposite the wall, so that the distance from the lamps to the wall is 75 ft., it can instantly be seen whether the concentrated beam of light rises above the white line or not. The lamps should first be focused so that they give the best beam, the engine then run at a speed corresponding to 20 m. p. h. to give the generator voltage instead of the battery voltage on the circuit and, finally, the lamp brackets should be bent till the beam comes down to the white line or a little below it. The whole job takes less than 10 min. and anyone can do it.

AKRON SHOW DEC. 1-8

Akron, Ohio, Nov. 15—The Akron show will be held in the new Ohio National Guard armory Dec. 1-8. This date will mark the official opening of the armory, and the dedication ceremonies will take place at that time. It is estimated that fifty-eight different makes of cars will be exhibited, and in addition to providing space for these cars, the armory is capable of seating 4000 people. In the strictest sense of the word, the show is not to be exclusively a motor car show. It is planned to have one of the latest types of war planes from the factory on exhibition, together with a war truck of the type used in raising and lowering captive observation balloons.

September Exports Gain

Truck Shipments Increase 21 and Passenger Car 9 Per Cent Over August

United Kingdom Takes $2,000,000 Worth Altogether

WASHINGTON, Nov. 16—Exports in September gained, on an average, 21 per cent as compared to August. Truck shipments showed a gain of 33 per cent, while passenger car exports were 9 per cent higher. The truck exports in September numbered 1251, valued at $3,675,717, as against 838 in August, valued at $3,645,280, compared with 3697, valued at $3,283,354 in July. The following figures show there is little difference in the number of truck and car shipments during September, 1917, and September, 1916. During September, 1916, 3585 cars, valued at $2,810,405, and 1835 trucks, valued at $5,203,215, were shipped.

			1917		
Mos.	Cars	Value	Trucks	Value	Parts
Sept.	4077	$3,645,280	1251	$3,675,717	$1,802,051
Aug.	3697	3,283,354	838	2,289,307	2,415,554
			1916		
Sept.	3585	$2,810,405	1835	$5,203,215	$2,095,188

The largest buyer was the United Kingdom, which took $2,000,000 worth, 682 trucks, valued at $1,802,813, and sixty-eight cars, valued at $249,694. France bought nearly $500,000 more in September than in August, taking 188 trucks, valued at $883,018, and sixty-three cars, valued at $24,820. The largest passenger car buyer was Canada, which imported 595 cars, valued at $553,316.

Dodge Bros. Bring Out Light Truck

As announced in the Feb. 22, 1917, issue of MOTOR AGE Dodge Brothers were preparing to market a light commercial car, and the first of these are now being forwarded to distributors. This new commercial car is the result of a consistent demand for the passenger car chassis fitted with a light delivery body.

The truck has been designed to carry a load of 1000 to 1500 lbs., and is practically the same as the passenger car except increased strength in the steering knuckles and springs and 33 by 4 in. tires, plain tread in front and non-skid in rear.

The engine is a four-cylinder, L-head cast in block having a detachable head with a bore of 3⅞ in. and a stroke of 4½ in., which is in a unit with the three-speed gearset, and a clutch of the dry-plate disk type. The gear ratio on direct drive is 4 to 1.

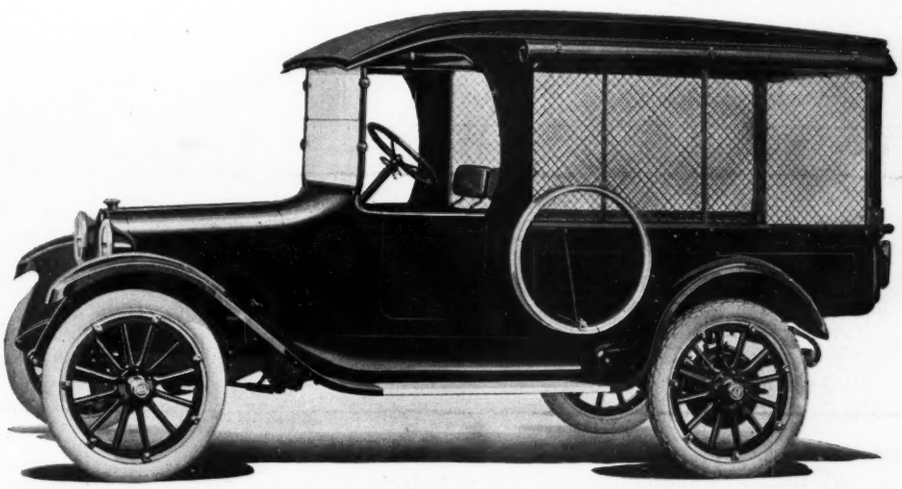
On the new truck the gasoline tank has been placed under the driver's seat, and the steering post has been raised to permit greater loading space. The frame has been strengthened and lengthened so that a loading space of 72 by 43 in. is available back of the driver's seat, which is rather large for a truck of 114-in. wheelbase, this being the same as the passenger car.

The body is especially well designed to meet the requirements of a light commercial car, being constructed of pressed steel throughout and of the express type with a permanent top and cab measuring 54 in. from the floor of the body to the inside of the top. The sides are inclosed with removable wire screes and durable oiled duck curtains which provide complete inclosure in case of bad weather.

The balance of the specifications are the same as the passenger car and the finish is of black enamel.

FORD GETS NEW ORDER

Washington, D. C., Nov. 17—Reports here are to the effect that the Ford Motor Co. has been given a contract for $300,000,000 worth of airplane parts and that the company will start immediately upon a contract for 2500 airplane cylinders. It has also been announced that a part of the plant already has been turned over to the Government for the manufacture of war equipment, including principally parts for motor trucks and airplanes.



Dodge Brothers light truck, which will carry from 1000 to 1500 lbs.

Winter Versus Fuel Economy

How Effect of Cold Weather on Cars Can Be Averted and Gasoline Saved

In Two Parts: Part II

By B. M. Ikert
Motor Age Editorial Staff

IT was pointed out in last week's issue of MOTOR AGE that priming the cylinders constituted one of the essentials for easy starting with most cars. Various priming devices, electric heating plugs, together with specially-designed manifolds were described, all designed to coax the engine into a firing mood. Owners who have the facilities for doing the work can make their own priming devices, but the market affords so many efficient systems at a reasonble cost that it is hardly worth while to bother about a home-made affair.

Many motorists make the mistake of trying to adjust their carbureters when the engine is cold. Then when the engine gets warmed up it runs on too rich a mixture. Adjustments especially in winter should be made when the engine is hot and with the choker part way out, say about half way.

Herewith are shown two devices that can be made to help carburetion on old cars that have a long intake manifold, or where there is no butter-fly valve in the air-intake for starting. In one a small pipe is tapped to the exhaust manifold and run down along the intake manifold, being held away from the latter slightly by asbestos pads. Asbestos is then wrapped around the manifold and pipe and the heat thus obtained will help to prevent the gases from condensing in the manifold at the point where it branches out to the cylinders.

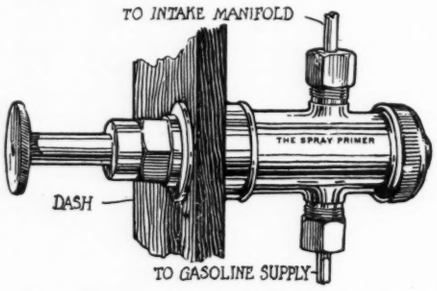
The home-made choke consists of a metal tube closed at the outer end and slipped over the air intake. There is a hole cut in the side of the tube that is normally open. A piece of tubing which will comfortably slip over the other serves to cut off the air by covering the opening. To keep the hole open, two springs are attached to the slide and to a strip of metal soldered on the end of the tube. A cable is fastened to the slide and run forward, if the car is cranked by hand, or to the dash, if a starter is used. On an old carbureter where a device like this would be used, a hot-air pipe gives additional good results at moderate temperatures and is an absolute necessity in winter. Instead of closing the end of the tube, as shown, it could be left open and the hot-air pipe run directly into it, fastening the springs for the slide in a different way.

In addition to the priming and manifold heating devices described last week, the following will be found adaptable to nearly every make of car.

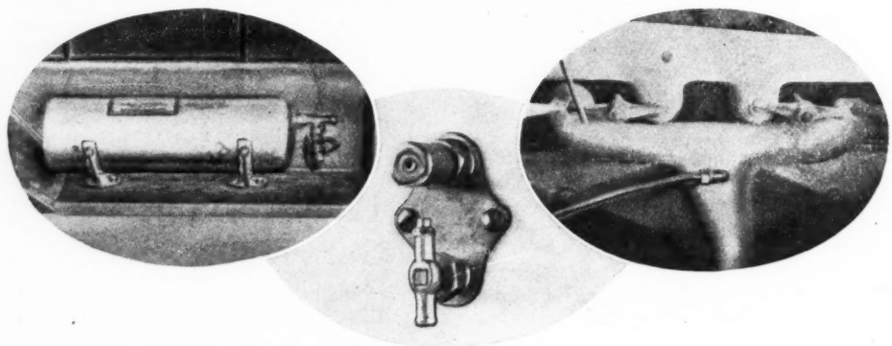
Perfection Primer—This primer is operated by and simultaneously with the electric starter. It is installed in such a way that when the starter button is pressed a charge of raw gasoline is injected into the manifold and shot down in a spray to the carbureter. There is also a magnetically operated pump connected to the ordinary source of current on the car. It is stated that the device is easy to install. The price is $5. It is made by the Motor Cooling Systems, Baltimore, Md.

Crone—The Crone primer consists of a miniature plunger pump that draws gasoline from the main line and forces it into the intake manifold. One stroke of the pump, it is stated, supplies sufficient fuel for a proper mixture to start. The plunger of the pump is fitted with a positive shut-off. The Crone primer is made in a number of styles, suitable for installation on any car. The price is $6. The maker is F. G. Crone, Buffalo, N. Y.

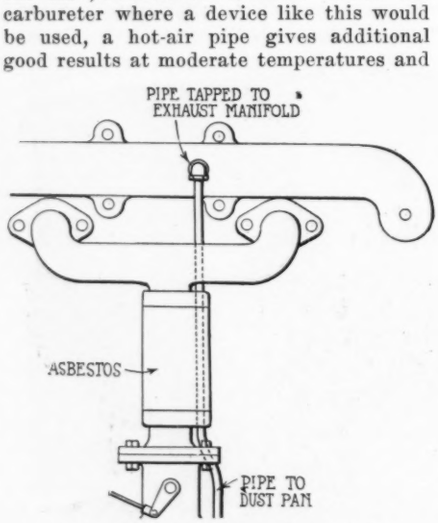
Spray—The Spray primer is a small injector pump, the operating button of which is attached to the inside of the dash or floor-board. The suction part of this pump is connected to the gasoline supply pipe between the tank and carbureter. The exhaust part is connected to the intake manifold; one stroke of the plunger sprays a charge into the manifold; the reaction of

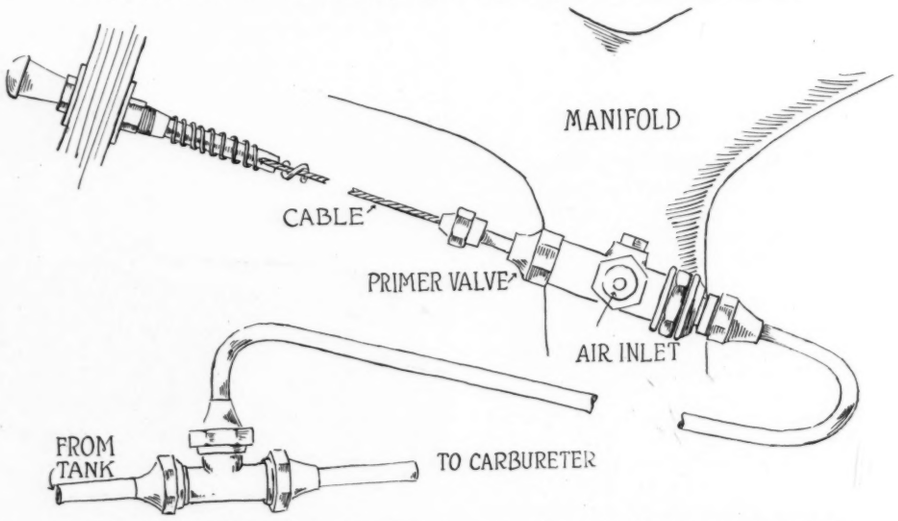


Installation of Spray primer on dash

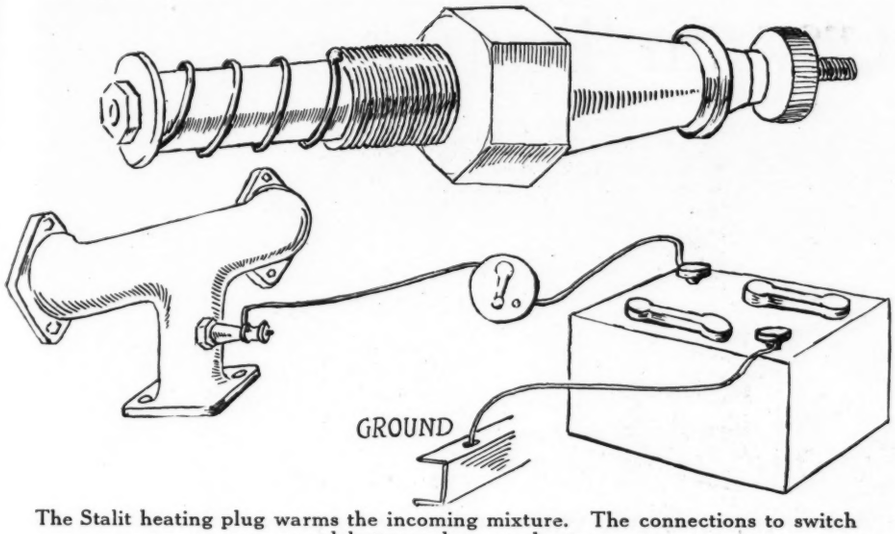


Prest-O-Primer outfit, showing tank, controller and manifold tubing





To the left is shown a simple way to heat the intake manifold. The Copley primer, to the right, forces gasoline and air to the manifold, being a sort of auxiliary carbureter



The Stalit heating plug warms the incoming mixture. The connections to switch and battery also are shown

the plunger pump automatically charges it for the next time. It can be attached to any car in an hour, it is stated. It sells for $7.50. The Spray Primer Co., 11 Pemberton Square, Boston, Mass.

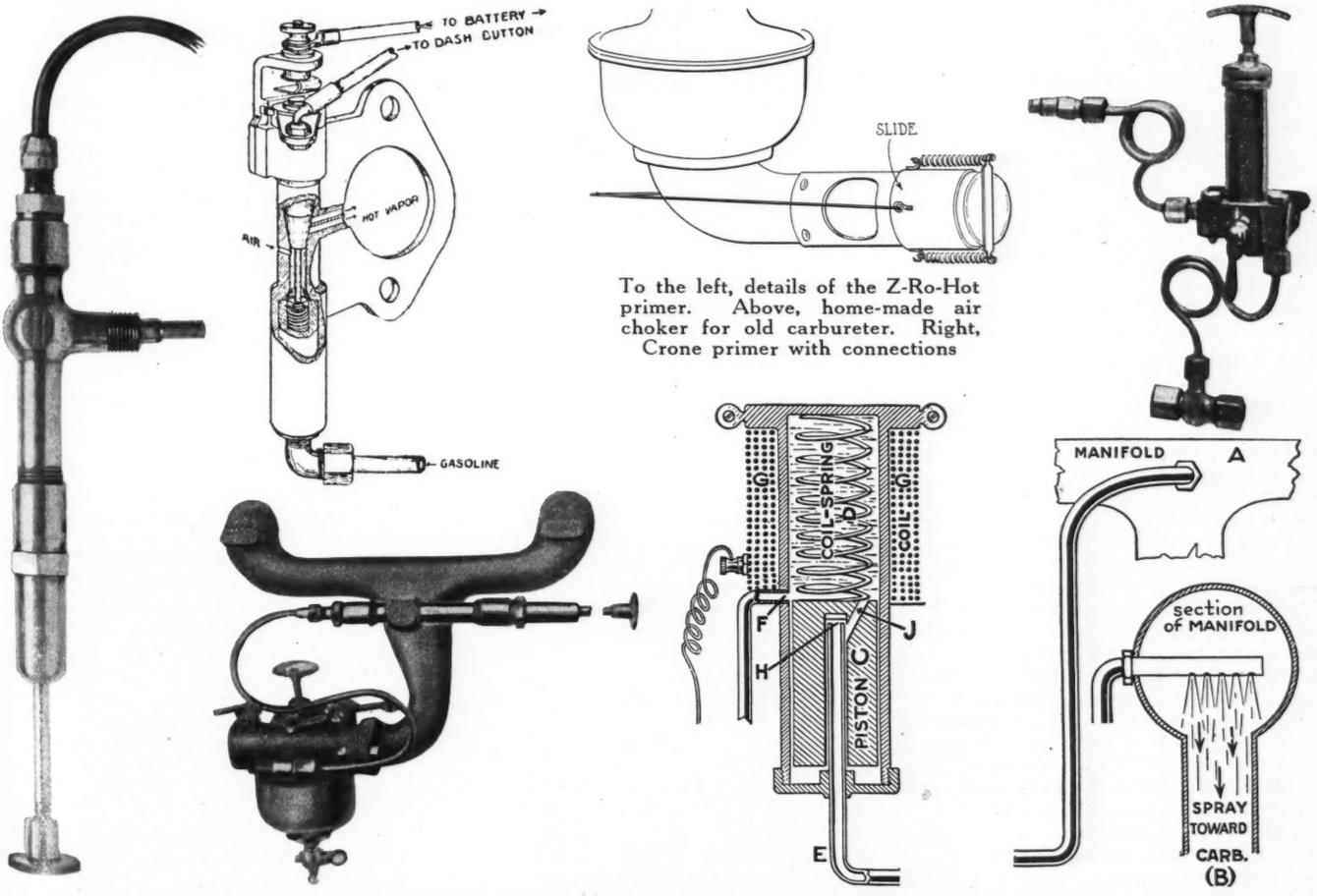
Maltby—This primer is a pump, the body of which attaches to the intake manifold by a side outlet. The base of the pump connects with the gasoline line at the carbureter by means of a T-connection. The pump injects fuel into the manifold in the form of a spray which is said to break up the fuel particles thoroughly and assist in easier starting. A nickel-plated handle on the instrument board operates the primer. Price, $7.50. It is made by the Maltby Auto Specialty Co., Detroit.

Stalit Heating Plug—The Stalit plug screws into the intake manifold just above the carbureter. Connection is then made to a source of electric current using either dry cells or storage battery, interposing a small switch in the circuit. When the latter is closed the plug heats and helps to vaporize the gasoline mixture in the manifold. To install requires drilling and tapping a ¼-in. hole. The price is $2.25. G. Staats & Co., 74 Bayard street, Brooklyn, N. Y.

Copley Primer—This primer is in the form of an auxiliary carbureting device. It consists of the body of the primer, which attaches to the intake manifold and connects to the gasoline line back of the carbureter. There is an air valve which is operated in conjunction with the priming valve by a cable leading to the dash. The primer delivers a rich mixture as long as it is held open. Price, $5. Bay State Pump Co., Boston, Mass.

Z-Ro-Hot Primer—This device consists of a combination heating and priming apparatus. When the handle on the dash is pulled connection is made with an electric-thermal unit which heats the gasoline coming from the carbureter to the manifold to a high temperature. This hot vapor is then sucked into the cylinders where it can explode more readily. It can be fitted to any car and requires about an hour's time to install. It is made by the Motor Engineering Co., 1523 Fort street, Detroit.

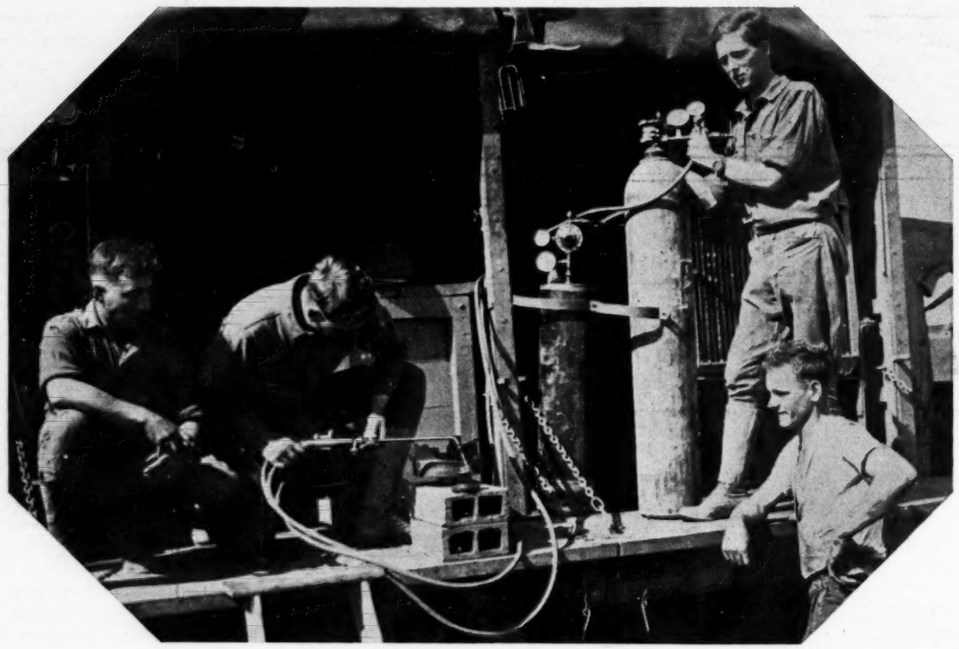
Prest-O-Primer—The outfit consists of an automatic reducing valve which connects the Prest-O-Lite gas tank and maintains a low even pressure in the brass tubing line leading to the Prest-O-Primer controller, which is mounted on the dash or floor board as desired. The gas is conveyed from the controller to the intake manifold by another length of tubing. In the case of a hand-cranked car an attachment is furnished that operates the primer from the front of the car. Price, $8.50. Prest-O-Lite Co., Inc., Indianapolis, Ind.



To the left, details of the Z-Ro-Hot primer. Above, home-made air choker for old carbureter. Right, Crone primer with connections

Two views of the Maltby primer, left, showing installation on Ford manifold. The two diagrams on the right show the Perfection primer with magnetic coil G operating piston C against the coil spring D. It attaches to the manfold as at A. B shows the spray action

Our Boys in Training



Traveling machine shop used by forces at Camp Kearny, Linda Vista, Cal. This shows an acetylene welder in use

Typical Army Cantonment, How It Was Built, and Advantages Afforded

ONE hour at any one of the sixteen national army cantonments will give one a better idea of what this war is to mean to the United States than reading the foreign official war reports for six months. To those of us who have read of Uncle Sam's preparedness only through the newspapers, this war still seems a far way off. But, indeed, it is not. War is upon us and those in authority are preparing for it on a scale so stupendous as to dwarf anything military we have ever done before.

Visit Is Best

The best way to realize the magnitude of our preparations is to visit one of these national army cantonments. There one will see a complete city to house from 38,000 to 42,000 citizen soldiers; a city with permanent steam-heated barracks for winter occupation by our soldiers of the draft; a city complete in itself with its own water system, sewerage disposal plant, bakery, laundry, refrigerating plant, hospital, fire department, postoffice, railroad freight station, stables for 10,000 horses and mules, motor truck garages, athletic fields, moving-picture buildings, warehouses and a parade and drill ground of approximately 1000 acres, or a square of more than 1 mile to the side. There one will find a military city covering from 2000 to 7000 acres, equivalent to squares with sides from 3 to almost 10 miles long; a city almost as large as Salem or Fitchburg, Mass., in the East, almost as large as Augusta, Ga., in the South, Bay City, Mich., in the central West, or as big as San Diego, Cal., or one-half as large as Tacoma, Wash., in the far West.

Note—This is the second training camp article to appear in Motor Age. The third and last will be published soon.—Editor

Every true American should see the cantonment nearest to the city in which he lives in order to get a true realization and proper perspective of just what this war will mean to us and the tremendous amount of preparation we are making to insure that we do not emerge as losers from the great struggle with the Huns. Go see personally just what Uncle Sam is doing for the housing and training of our first really National Army.

See your nearest cantonment and visualize the tremendous scope of the work. Then remember that such a cantonment is only one of sixteen in other parts of the country; that the preparation at any one camp is only one-sixteenth of that which is to turn out our first National Army of over 500,000 men within six months, and that this is only the first quota of the great number of troops we must supply, exclusive of the former militia organizations and such units as the ambulance corps and the sanitary corps.

All sixteen cantonments are built on the same general lines, differing only in details made necessary by a slight variation in the number of men to be housed at the different locations and by the topography of the locations themselves. The camps were located by departmental commanders and their recommendations reviewed by the general staff and later approved by Secretary of War Baker. While the sites were being chosen, Colonel Littell's staff was busy designing a typical cantonment for each of the sixteen divisions. This work included the planning of the buildings and the estimates on general sewerage and water requirements and other general work that could be done before maps of the various locations were procurable.

1000 Wooden Buildings

Each cantonment consists of approximately 1000 timber structures of the simplest possible type. These are unpainted, while a few buildings used as garages and power plants are sheathed in metal to reduce fire risk. The various buildings are standardized according to the purpose for which they are intended. For instance, there is a standard two-story barrack for a company of 123 men. These standard two-story barracks are generally 43 ft. wide and of different lengths depending upon whether more than 123 men are to be accommodated. At one end is a single-story kitchen with a pantry and sleeping room for the cooks. The mess hall is adjacent to the kitchen and separated from it by a long counter where the men will eat.

Again there are standard officers' barracks, some of which are single-story buildings with a kitchen at one end and an office at the other, with side rooms in the middle. These are 10 ft. 6 in. by 8 ft. 4 in. and are reached from off a central hall. Another type of officers' barracks is two stories high with larger rooms, shared by two officers.

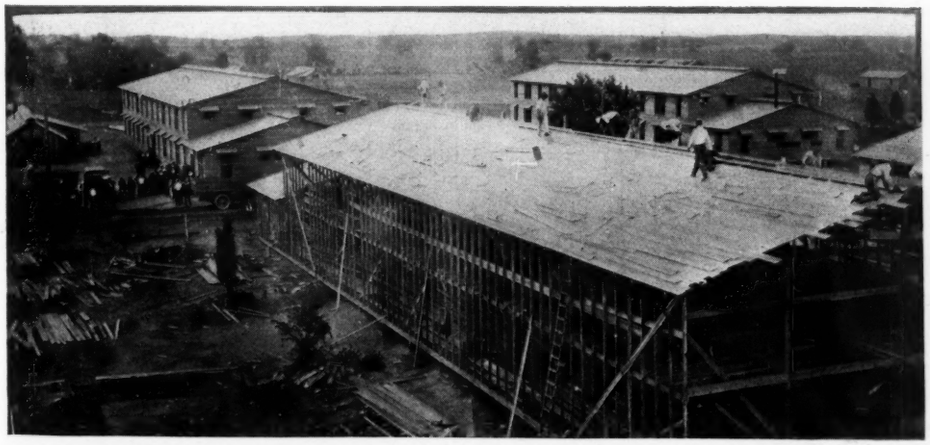
The general work of construction is remarkable chiefly because of the enormous

(*Concluded on page* 31)

Tractors were used to clear the ground at Yaphank, L. I. This work was done when plans for the camp first were made

In oval — The fly-catchers at Wrightstown over refuse vaults. This protects the camps until the refuse is carted to disposal dumps

Right—Five-ton White truck fitted up for repair work and now in use at Wrightstown. This truck saw service in Mexico



These are typical company houses in three different stages of construction at Wrightstown, N. J. These houses are all steam-heated for winter use

Package Delivery Service

What the Records of Twenty Companies Show It Costs to Run Motor Trucks

THE problems of distribution and marketing by motor truck may be subdivided into three general divisions, as follows:

1—Package delivery.
2—Bulk delivery.
3—Delivery by contract.

The graphical representation of operating costs shown are from data derived from trucks which would be classified as being in package delivery service.

The operating cost values upon which the following calculations and curves are based represent the average cost of some twenty different transportation companies operating in and about Chicago. These figures are conservative and compare very favorably with the hitherto published reports of transportation companies and truck manufacturers. Of course, it must be remembered that the cost of hauling varies for different localities and the cost figures given may not apply in all cases.

Total Operation Cost

The total cost of operating a truck per day is the fixed charges per day plus the operating charges per day. The operating charges per day is equal to the operating cost per mile multiplied by the miles per day.

The fixed charges per day are as follows:

a—Interest on the investment.
b—Insurance.
c—License fees.
d—Drivers' wages.
e—Garage charges.

The operating charges per mile are as follows:

a—Gasoline consumption per mile.
b—Oil and grease per mile.
c—Mechanical repairs.
d—Tires.
e—Depreciation.

Interest on the investment is figured at 6 per cent.

Insurance covering fire, theft, liability and collision varies from $183 to $270 per year.

State and city licenses must be included. These are figured for Illinois and Chicago.

Wages of the driver run from $3 to $4 per day.

Garage charges are for storage only at the rate of 50 cents per day.

Gasoline is taken at 20 cents per gallon, the consumption varying from 10 to 4 m.p.g.

Lubricating oil is taken at 50 cents per gallon, the consumption varying from 400 to 625 m.p.g.

Grease costs are taken from .1 to .3 cents per mile, varying with the size of the unit.

Tire sizes are taken as supplied by the manufacturers and figured at net cost based on a guaranteed life of 7000 miles.

Mechanical repairs, including body repairs, etc., vary from 1.5 to slightly over 3 cents per mile from 1-ton up to the 6-ton unit.

Depreciation is figured on a basis of a 150,000 mile-life for the trucks. Thus, if a truck averages 15,000 miles per year, its life will be ten years. If the initial cost were $3,000, depreciation would be at the rate of 10 per cent per year. This figure varies from 10 per cent to 15 per cent, depending on the mileage and capacity of the unit, the cost of tires being deducted from the original cost.

Cost Per Mile

The following table gives the fixed charges per day and the cost per mile for trucks of various capacities:

CAPACITY, TONS	FIXED CHARGES PER DAY	OPERATING COST PER MILE.
1	$4.52	$ .08
2	4.70	.105
3	5.26	.13
5	6.26	.175
6	6.33	.19

For example, the cost of operating a 2-ton truck per day with a daily average of 50 miles is $4.70+50×.105=$9.95 per day.

The comparison of total charges per day for operating trucks of different capacities traveling various mileages is shown in Fig. 1. In this curve the ordinates, or verticals, indicate the dollars per day operating cost and the abscissas, or horizontals, the mileage per day. On account of these curves being straight lines it will be noted that the cost per day increases in constant ratio with the daily mileage. Note that these curves are continued by dashed lines to 0 miles per day. This indicates approximately the amount

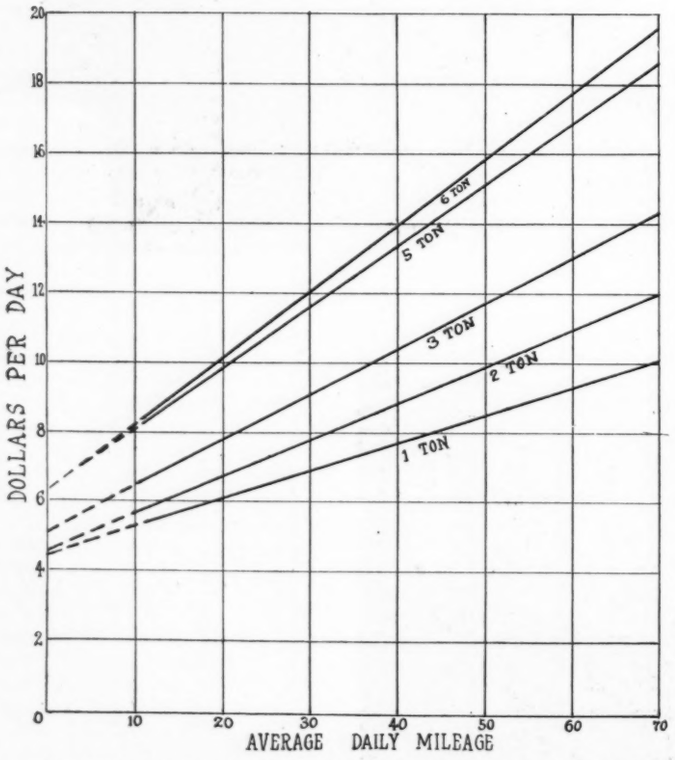


Fig. 1—Curve showing comparison of total charges per day for trucks of different capacity and mileage

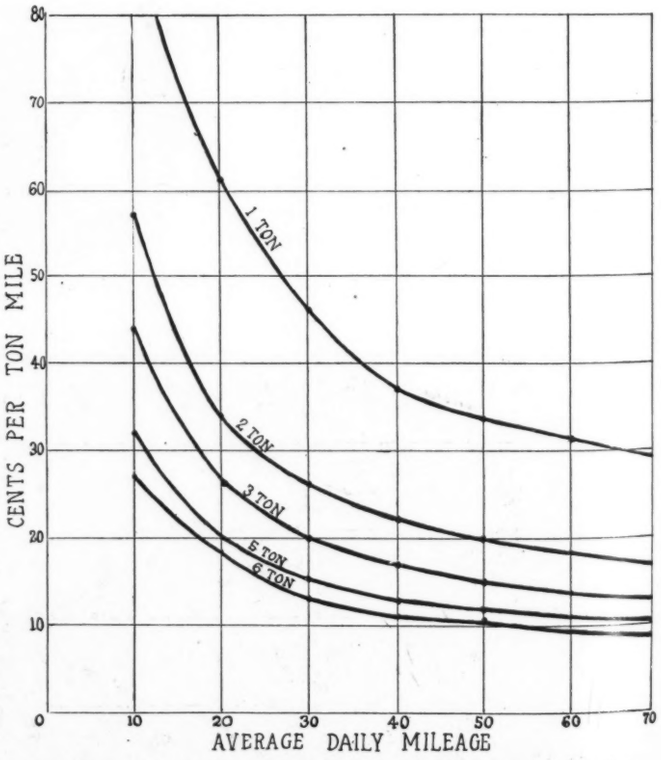


Fig. 2—Curve showing comparison of cost per ton mile, showing how saving can be effected by mileage

chargeable against a truck per day when it is temporarily out of service.

To compute the cost of operation per ton-mile it is assumed that the unit carries half its rated capacity the full distance traveled or carries its rated capacity out from a loading depot and returns empty. If a vehicle is operating between two such depots where it can be loaded both in and out, its cost per ton-mile will be correspondingly reduced and would result in a curve showing less cost per ton-mile than those illustrated.

The curve relating to cost per ton-mile plotted on ordinates and miles per day as abscissas shows that a great saving can be effected by increasing the mileage per day of the units. These curves are of interest when selecting sizes of trucks for certain class of hauling.

For instance, at 50 miles per day note that a 6-ton truck will haul 1 ton of load 1 mile for 11 cents; a 5-ton, for 12 cents, and a 3-ton, for 15 cents. Note that the same economy at 20 cents per ton-mile can be had by a 6-ton operating 18 miles per day, a 5-ton operating 20 miles, a 3-ton operating 30 miles and a 2-ton operating 50 miles per day.

Fig. 3 shows a comparison of the total cost in dollars per day against the rated carrying capacity of trucks based on a mileage of 50 miles per day. The curve shows that the operation cost increases in direct ratio to the carrying capacity of a truck up to units of 5 tons and from there on decreases slightly as the tonnage increases.

Table I exemplifies the large reduction that can be effected by increasing the mileage per day of the various units. Thus, by increasing the mileage per day of a 3-ton from 30 to 40 miles a saving of 15 per cent is effected and from 30 to 50, 22 per cent is saved.

Table II compares the operating expense of two 2-ton trucks in package delivery service over a period of a year. By analyzing cost data of this nature, a transportation executive is able to check the manner in which the garage and traffic departments are handling the various units.

Note that these two trucks compare very favorably so far as the garage is concerned, as the cost per mile of operation is practically the same for both, yet the cost per ton shows a variation of 21 per cent, indicating that either the traffic department was at fault or it was impossible to do better on account of a poor route.

The cost per mile per ton carried shows a variation of about 10 per cent, yet the result itself may be considered as slightly better than the average. This possibly is due to the fact that these units were carrying slightly larger loads than their rated capacity.

Each particular class of transportation presents an individual problem and must be analyzed thoroughly to get the best results from the equipment. For example, a large Chicago company engaged in delivering coal to loop office buildings experienced a great deal of trouble and loss of time in unloading on account of the narrow alleys not permitting the trucks equipped with rear dump hoist bodies to back in for unloading. This condition existed for some time until finally a dump hoist body with a side outlet was developed.

The first day this truck was placed in service it hauled 40 per cent more tonnage than the best recorded performance of any of the rear dump trucks. This is only one example of what was done by this company to increase the efficiency of its transportation equipment and shows that it requires a very capable executive to get the best results from a company's equipment.

In this connection it would be interesting to compare the hauling costs between horses and motor vehicles. The walking speed of a horse is from 3 to 3½ m.p.h., covering from 12 to 16 miles per day, depending upon the number and having a hauling capacity of about 2 tons per horse. Table III gives the cost per ton-mile of hauling with horses and it is noted that it costs twice as much to do work with horses as with motor vehicles. For example, at 14 cents per ton mile a 5-ton motor truck will operate 34 miles against the horse's 12.

An eastern firm recently made an interesting comparison of the cost of hauling over the same route between a 5-ton truck and a four-mule team hauling 4½ tons. It was found that the motor truck could haul at 9.9 cents per ton mile as against 13.9 cents per ton mile for the mule team. The motor truck saved 4 cents per ton mile, amounting to about $6 per day.

ERIE COMPLETES TRUCK DESIGN

Painesville, Ohio, Nov. 16—The Erie Motor Car Co. has completed the design of its one-ton truck and plans to start production at an early date. This truck is constructed throughout of standard units and incorporates a Continental engine, Fuller gearbox and clutch, Torbensen rear and Columbia front axles and Lavine steering gear. It has a 127-in. wheelbase and is mounted on solid tires 34 by 3 front and 34 by 4 rear. A starting and lighting system is part of the regular equipment. The price of this truck will be announced soon.

MEXICO TO HAVE CAR PLANT

Monterey, Mexico, Nov. 16—If the new company, Fabrica de Automoviles, which has just been incorporated under the laws of Mexico with principal offices here, is successful in carrying out its plans the first motor car plant to be established in this country will be in operation within the next few months. The company has a capital stock of 600,000 pesos, equivalent to about $300,000. Luther L. Lane, Brownsville, Tex., promoted the organization of the company and is acting president. Among its larger stockholders are some of the wealthiest business men of Monterey and Northern Mexico. J. G. Zambrano of Monterey, business associate of Nicaforo Zambrano, governor of the state of Nuevo Leon, is acting secretary and treasurer.

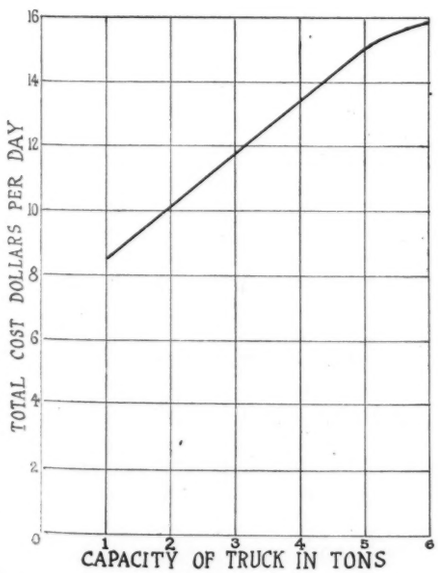


Fig. 3—Comparison of total costs per day against rated carrying capacity based on a daily mileage of 50 miles

TABLE I—REDUCTION IN COST PER TON MILE IN PER CENT DUE TO INCREASING DAILY MILEAGE

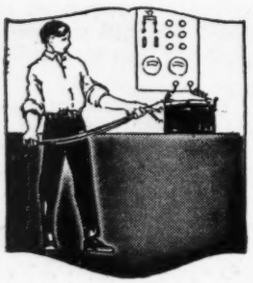
INCREASING DAILY MILEAGE FROM	TO	REDUCTION IN COST PER TON-MILE IN PER CENT 1-TON	2-TON	3-TON	5-TON	6-TON
10	20	43	40	40	37	37
20	30	24	23	23	23	23
30	40	17	15	15	13	7
40	50	11	9	10	7	8
50	60	9	7	6	4	6
60	70	7	5	4	4	5
30	50	26	23	22	20	15

TABLE II—DAILY AVERAGE OF 2-TON TRUCKS IN PACKAGE DELIVERY SERVICE OVER A PERIOD OF ONE YEAR

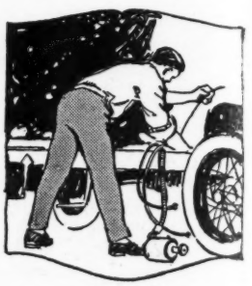
DAILY MILEAGE	DAILY LOAD IN TONS	TONS PER TRIP	FIXED CHARGES PER DAY	OPERATING COST PER DAY	TOTAL COST	COST PER MILE	COST PER TON	COST PER TON PER MILE
52	6.7	2.23	4.07	7.85	11.92	22.9	1.80	10.025
47	7.8	2.6	3.96	7.08	11.04	23.5	1.41	9.00

TABLE III—COST OF HAULING WITH HORSES

TONS	TEAMS (HORSES)	DAILY RATE (DOLLARS)	MILE PER WORKING DAY	TON MILES	COST TON-MILE (CENTS)
1	1	5.50	16	16	34.37
2	1	6.50	16	32	20.31
4-5	2	8.50	12	48-60	17.70-14.16
8	4	17.50	12	96	16.35



Electrical Equipment of the Motor Car



By David Penn Moreton & Darwin S. Hatch.

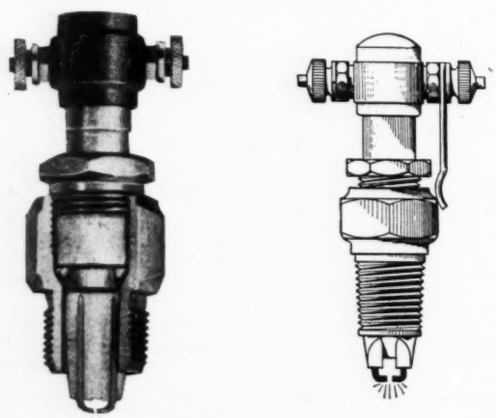
Editor's Note—Herewith is presented the seventieth installment of a weekly series of articles begun in MOTOR AGE *issue of June 29, 1916, designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the U. P. C. Book Co., Inc., New York, in a size to fit the pocket conveniently.*

The fundamentals of electrical circuits of the motor car were explained through their analogy to water systems, and the relations of current pressure and resistance were brought out. This was followed by an explanation of series and multiple circuits, how electricity is made to do work in lighting, starting, signalling, etc. Calculating the capacity of a battery for starting and lighting and the cost of charging storage batteries and determining the torque a starting motor must develop were explained. Action of primary batteries and dry cells was considered. A section was devoted to the makeup and action of lead and Edison storage batteries, and another to the care of lead batteries in service and the best methods of charging them. Magnets and electromagnetism then were considered, and the principles of generators and motors explained. A section on generator output was followed by one on the purpose and operation of the cutout. Electric motors and engine and motor connections then were considered. Ignition was taken up next.

Part LXX—Spark Plugs

IN the series type of spark plug the spark occurs between two central electrodes each of which is isulated from the shell of the plug. A plug of this type is shown in Fig. 388. The object of such a plug is to furnish a means of providing two sparks in each cylinder by a standard ignition system. A plug of this type and a standard type of plug are mounted in the wall of the combustion chamber. The high-tension wire from the ignition system is connected to a terminal of the series plug, and the second terminal is connected to the central electrode of the standard plug, thus connecting the gaps in the plugs directly in series. The object of such an arrangement is to provide double-spark ignition. Experiment has shown a slightly increased power when two sparks occur simultaneously in different parts of the combustion chamber, especially in the T-head type of engine cylinder in which the two plugs can be located in the oppositely-placed valve parts. As the great majority of engines are of the L-head type and since the advantages of the series type of spark ignition at least are so very slightly greater than the single-spark type, there is very little advantage to be gained in its use..

The series type of spark plug may be used as a grounded return type by an attachment as shown in Fig. 389. All this attachment does is to form a metallic conductor between one of the terminals or electrodes and the shell of the plug which is, of course, in electrical contact with the engine cylinder. The high-tension ignition lead, of course, is connected to the terminal on the spark plug to which the special attachment is not connected.



Figs. 388, *left, and* 389—*Efficiency spark plug and special attachment for series spark plug*

Magnetic Type of Plug

This type of spark plug was developed with a view to overcoming the trouble in the operation of the make-and-break plug as used on the low-tension ignition systems. A section through a plug of this type is shown in Fig. 390, and its operation is as follows: A solenoid, A, surrounds a plunger, C, whose lower end is held in contact, D, by a spring, B. The magnetic pull due to a current in the winding A lifts the plunger and causes a spark at D. Plugs of this type have found little use on the motor car, as the high temperatures to which they are subjected in such applications draw the temper of the plunger spring and often seriously injure the insulation of the solenoid winding. Their use has been more extensive in connection with stationary engines where the temperatures are much lower.

Waterproof Plugs

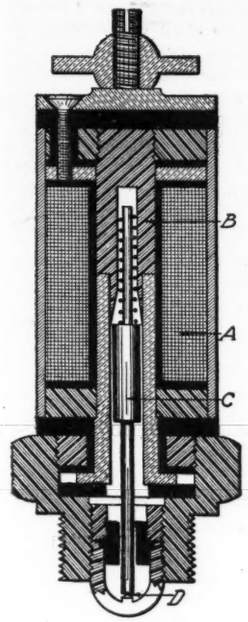
In certain applications of the gasoline engine, as on motor boat engines in particular, the spark plugs are likely to become short-circuited from the spray or dampness. A special plug is provided to prevent such an occurrence, and a plug of this type is spoken of as a waterproof type. The only difference in the construction of a plug of this type and the ordinary plug is the addition of a protective hook of hard rubber or other suitable insulation placed over the connections. A plug of this type is shown in Fig. 391.

Priming Plugs

The priming type of spark plug is one provided with a pet cock as shown in Fig. 392. This plug usually is used on engines which are not regularly equipped with priming or compression-release cocks.

Airplane Type

The construction of the airplane type of spark plug anticipates the development of great heat. A plug designed for this particular use is show in Fig. 393. The insulation core C is built up of



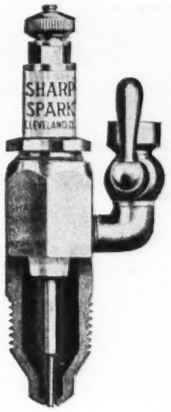
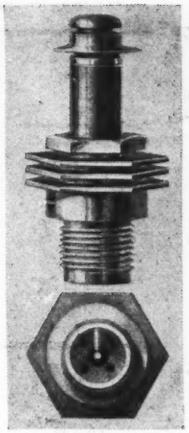


Fig. 390, left—Magnetic type of spark plug. Fig. 391, upper left—Waterproof type of spark plug. Fig. 392, upper right—Priming type of spark plug



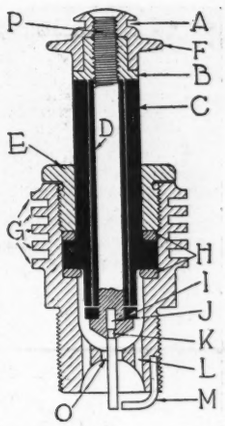


Fig. 393—Airplane type of spark plug, the Pittsfield, showing the structure in cross section

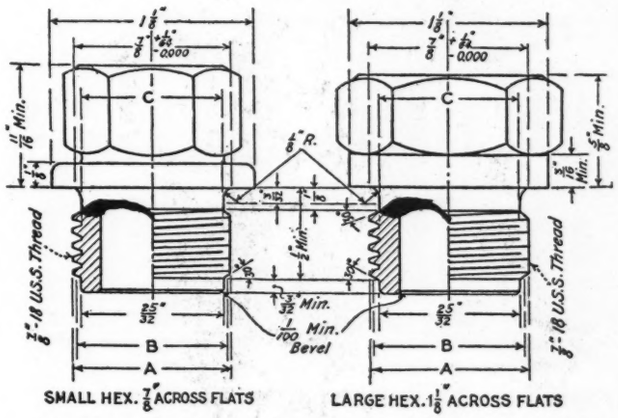


Fig. 394—S. A. E. standard dimensians for spark-plug shells

mica washers and has square shoulders. These square shoulders afford two gasket seats, and when the core is clamped in the shell by the check nut E it is centered accurately and a tight joint is formed. This construction gives a plug shorter than with conical fits and thus improves the heat radiation through the stem. The lower end of the shell has a baffle plate, 0, which tends to keep oil from the mica. Perforations, L, in the baffle plate prevent burnt gases from being pocketed behind the plate and pre-igniting the charge. The stem P is made of brass or copper for superior heat conductivity, and the electrode J is swedged in the bottom of the stem, as shown at K. The shell is finned, as shown at G, to provide greater heat-radiating surface. A fin, F, at the top of the stem also increases the radiation of the heat from the stem and electrode. The top of the fin and portion is countersunk slightly, and the stem is riveted into it, thereby preventing leakage past the threads on the stem. The finned portion is necked at A to take a slip terminal. In building up the core a small section of washers, I, is built up before the mica insulating tube D is placed on. This construction gives a better support for I. The baffle plate 0 is bored to allow the electrode J to pass through, and the clearance between the baffle plate and the electrode is larger than between the firing joints, as there is no danger of spark jumping from electrode to baffle plate. This plug is supplied with or without the finned portion.

Plug Threads

The straight-threaded plug is standard European practice. The thread itself is usually fine pitch. This type of plug is screwed in tight against a gasket of copper or asbestos to prevent breakage. Foreign-made plugs usually are referred to as metric plugs, as the thread dimensions are based on the metric standard.

All spark plugs in this country were made first with an iron-pipe thread, which has a taper of ¾ inch to the foot, and the plug is screwed into the cylinder as far as the taper will permit, no gasket being used to hold the compression. This is not altogether satisfactory, and since the electric system is not used very extensively in this country, a separate type has been developed and is known as the S. A. E. standard plug. The diameter and thread on this plug both are somewhat larger than those used abroad.

The S. A. E. standards for spark-plug shells are illustrated in Fig. 394. All dimensions below the shoulder are identical for both sizes of spark-plug shells. The spark plugs can be turned in by hand, using a wrench only for final tightening, if the taps are made to dimensions as follows: Diameters, nominal dimensions, outside, A, .875 in.; pitch, B, .839 in.; root, C, .803.

REGAL TO MAKE TRUCK

Detroit, Nov. 16—The Regal Motor Co. will bring out a 1-ton truck to sell in the neighborhood of $1,000 and be distributed through the present Regal dealers. This truck is driven by the standard Regal four-cylinder engine, used in the passenger cars, but with this exception the truck is entirely new in design. Equipment will be complete, including starting and lighting system and a choice of either express or stake body. The bodies are so designed that for a slight additional expense any one of ten body styles can be constructed. The front tires are 31 by 4 pneumatic and the rear 32 by 4 solid. An experimental truck has run approximately 1000 miles under actual working conditions, and when placed in production few changes will be made in the original design.

HARROUN PRODUCTION INCREASES

Wayne, Mich., Nov. 16—Production is increasing in the plant of the Harroun Motor Co. since its refinancing a short time ago. Reports from the factory state that twenty-five cars were completed and shipped last week and it is expected that three times that many will be completed this week. Production will be stepped up to normal as fast as possible. Approximately 300 completed engines are on hand, material is coming in very well and the labor market in this locality is good.

RANIER TO ADD TRUCK

New York, Nov. 19—The Ranier Motor Corp. will bring out a new truck model of 2500-lb. capacity. The wheelbase is 125 in., and the bodies are 8½ ft. behind the seat. Several standard bodies will be carried in stock, ranging in price from $150 to $250. The chassis will sell at $1,340.

The rear axle is of the worm-drive type with a gear ratio of 8¼ to 1. Clutch and transmission are Brown-Lipe, and the engine is standard 3¼ by 4½. Rear tires are Firestone solids, 32 by 4, and the front are pneumatics, with an option of cushion fronts at extra cost. Bijur starting and lighting also is optional. The Ranier ½-ton will be continued without change.

When the shortage of men became acute in England thousands of British women volunteered to drive ambulances on the Western front to permit the men to join the fighting forces. Here is one who not only volunteered but actually took the wheel of an ambulance—to her enjoyment seemingly

Women in War and Otherwise

AN American girl is to drive an ambulance in strife-torn Russia. Already Miss Natalie Camp of New York has driven an American ambulance returned from Russia through the city to collect funds and recruits for the hospital unit, and she is to head a unit of girl ambulance drivers in Russia. Miss Camp is the daughter of an engineer, Charles F. Camp, and has been driving motor cars since she was thirteen years old. She took part in a recruiting campaign for the British in Canada several months ago and ever since the beginning of the war has been trying to go to France as an ambulance driver.

Youth has put off her work as an ambulance driver so far. Miss Camp is only twenty years old now. She wants to go to Russia across the country and by Japan to conduct a campaign for money and recruits.

COASTWARD AND BACK

Somewhere in Texas or Arizona the Youngs, James, Mrs. James and the eight-year-old, are nearing the end of a memorable coast-to-coast-and-back journey that started June 23. Mrs. Young, who is acting in the double capacity of chauffeur and mechanician, has driven the car, a Kissel, throughout. She made the trip from San Francisco to New York without mishap or breakdown, never a stop at repair shop or garage, and so far she has duplicated her record on the homeward trip.

From San Francisco the party drove east by Placerville, Lake Tahoe and Reno. From Ogden they followed the general direction of the Union Pacific, stopping at Rawlins, Green River, Rock Springs, Sherman, then going on to Laramie, Cheyenne, and out across the prairies of Nebraska to Kearney and Lincoln from the foothills of the Rockies into the middle and eastern states, by Kansas City and St. Louis, and along the old military road into New York.

The route was considered so good the Youngs are going back the same way though by the southern route from Mississippi, striking across Texas into Arizona and Southern California.

"Great roads, wonderful scenery, plenty of good food and good friends, almost everywhere we stopped helped to make a perfect trip," said Mr. Young on the day of his departure from New York. "But all of these things put together might have been spoiled by a breakdown in the desert or wilderness, collisions, accidents or bad driving. We had no such drawbacks, not the slightest trouble, for the reason that we had the best chauffeur and mechanic at the wheel that ever drove over the long trail. I don't know the first thing about machinery, and an automobile is a deep mystery to me, but Mrs. Young knows every crank and cranny of the whole works. She's the best driver I ever rode with, and she can do a repair job or replace a tire quicker than any mechanician.

"It required exactly twenty-four running days, but we loafed in many an attractive place, and I had business engagements in others."

Save the Wheat

Heap high the farmer's wintry hoard!
Heap high the golden corn!
No richer gift has autumn poured
From out her lavish horn!

Let earth withhold her goodly root,
Let mildew blight the rye,
Give to the worm the orchard's fruit,
The wheat field to the fly.

But let the good old crop adorn
The hills our fathers trod;
Still let us, for his golden corn,
Send up our thanks to God!

J. G. WHITTIER—The Corn Song.

TO the South that is called "Down South," cornbread means only one kind, spoon, so called because, when properly made, it is a consistency best eaten from a spoon. It is a standing dish for breakfast as batter cakes or muffins and is served a la pan with vegetables at dinner in many households. The recipe, as obtained from some of the old darky cooks during the food campaign in the various cities, is:

One cup sifted cornmeal, scalded and cooled; one teaspoon salt; one teaspoon baking powder; two eggs; enough sweet milk to make a thin batter; and one tablespoon of melted lard. Put in a greased pan and cook in rather hot oven. Serve from the pan. If buttermilk is used, soda is substituted for baking powder. The cornmeal should be too soft to cut.

Federal Rye Bread

The Federal Food Administration has issued a recipe for making rye bread which is as follows:

One cup of milk and water, or all water; two tablespoons sugar; one teaspoon salt; one tablespoon fat; half a cake of compressed yeast; two tablespoons water; two and a quarter cups wheat flour; and two and a quarter cups rye flour.

Combine the ingredients. Make into dough and knead. Let rise until double the original bulk, and knead again. Then place into oiled bread pan, allowing the bread to rise to double its original bulk. Bake about 45 min.

For a still larger saving of white flour, use three cups of rye to one of wheat flour. Try saving sugar also by using a quarter cup of strained honey instead of the two tablespoons of sugar for which the recipe calls originally.

Our Boys in Training Camps

(*Concluded from page* 24)

scale on which it was carried out, rather than for any unusual features in the construction of the building themselves. The building within two or three months of a city to house 40,000 men involves very serious problems in the transportation of material and of securing and housing the civilian labor necessary for the work.

Some idea of the tremendous amount of material required for each of the cantonments may be had when it is known that about 25,000,000 ft. of lumber was required by each camp. More than 30,000 freight cars were necessary for the movement of cantonment supplies. The full services of these cars were required at a time when there was a tremendous increase in both government and commercial traffic, for the railroads at that time were supplying 15 to 20 per cent more freight service with the same number of cars than was given at the same time last year. Each cantonment also required 7500 doors, 37,000 window sashes, 4665 barrels of Portland cement and 500,000 yards of broken stone. The water supply of a cantonment is 2,500,000 gal. a day.

Another example of how the work was expedited is shown in the method pursued in sawing lumber to be used in the various buildings. The lumber was unloaded from the freight car on to a motor truck and then carried to within a few feet of the building site where a portable sawmill is set up between the pile of lumber and the building itself. Thus, with practically one handling, the boards of lumber were carried to the sawmill and from the sawmill direct to their place in the building. It is stated that at one of the cantonments a building 25 ft. by 220 ft. was erected complete in 90 min. In the Ayer, Mass., cantonment a contractor built ten one-story bunk houses for the laborers in two days. These buildings were 16 ft. wide by 110 ft. long and were divided into twenty-six rooms. Two hundred carpenters and 125 laborers were used. The 50,000 ft. of lumber used for this work was all sawed by hand so that the efficiency of the portable saw outfit was not approximated.

Truck Company No. 66, composed of thirty 3-ton Peerless trucks, was shipped direct from the army truck camp at Fort Sam Houston, Texas, to Wrightstown, N. J., and transported practically all of the lumber and the various other materials from the railroad siding to the sites at which the lumber and materials were used. In addition to the 3-ton trucks, the government also provided twelve ¾-ton Reos for light delivery and dispatch work. In addition to these vehicles, the contractors and sub-contractors employed about 175 two-horse teams. Additional wagons and trucks were used by the various contractors supplying the material not shipped in by rail. In addition to these vehicles, used for purely utilitarian purposes, there are also three large La France fire trucks and one Reo chemical cart to prevent the possible spread of any conflagration. Motor Truck Company No. 66 did the major amount of hauling at the camp and came to Wrightstown with eighteen of the original crew who saw service in Mexico under General Pershing.

Denver Show Celebrates 30,650 Motor Cars Sold

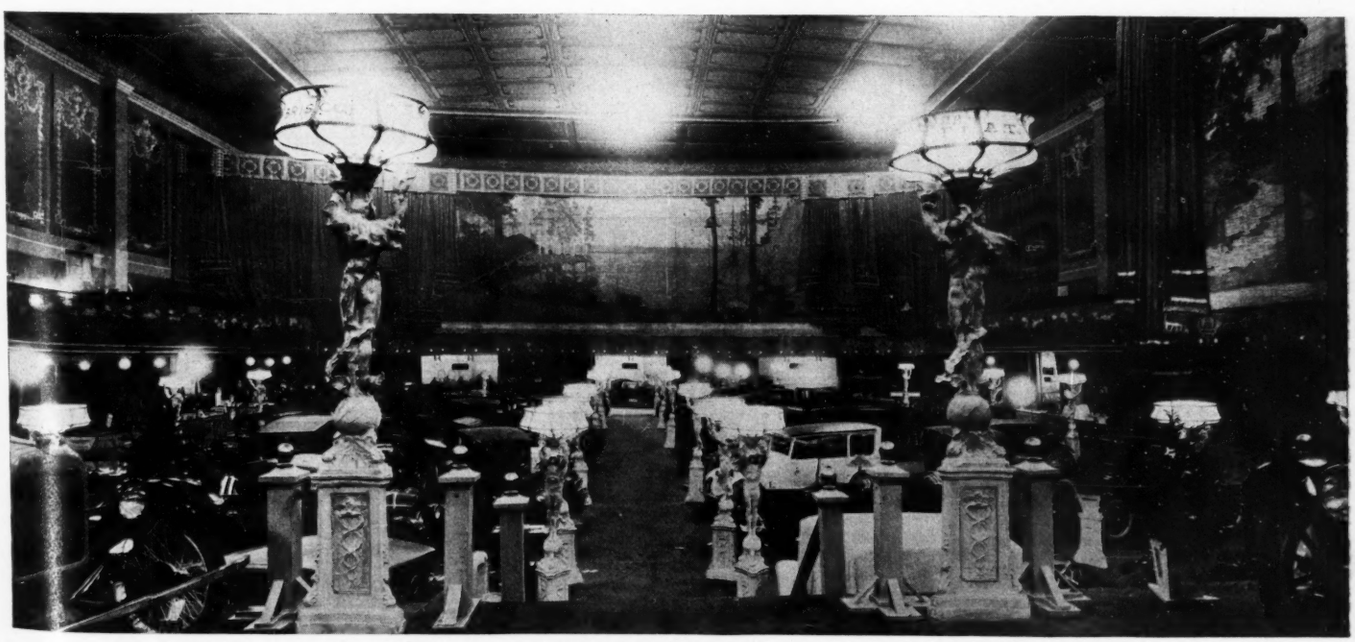
DENVER, Col., Nov. 17—The Rocky Mountain region's finest motor show, held this week in Denver, is considered a fitting celebration of the purchase of approximately 30,650 cars thus far in 1917 by Colorado, New Mexico and Wyoming, which comprise the main territory supplied by Denver district distributors. This is a gain of 50 per cent over last year's total registration of 60,224 for the three states. Besides, it is more than twice the 21-per-cent gain of 12,800 predicted eight months ago by officials of the three states at the time of the show here last March. The 1917 increase is made up as follows: Colorado, 21,130 cars, or 47 per cent; New Mexico, 5645, or 68 per cent; Wyoming, 3875, or 54 per cent.

Last year's registration for the district showed a gain of 22,677 cars, or 60 per cent over the 1915 total of 37,547. It would require a gain of only 38 per cent to give next year 35,000 more cars than the present 1917 total of 90,873, and Rocky Mountain distributors expect to see at least that big an increase.

There is now one car for every eighteen of the district's 1,600,000 people—a total population equal to half that of Chicago. The territory has one city of 250,000, about a dozen ranging from 5000 to 50,000, and scores of scattered smaller towns.

The show is being held in the city's $450,000 municipal auditorium. It has more than 100 cars, of half that many makes, exhibited by forty distributors, and there are also twenty-five accessory displays. The total attendance for the week is expected to reach 50,000 or 75,000. The event is managed by George A. Wahlgreen, aided by Assistant Manager Harry G. Moock and a committee of fourteen members of the Denver Automobile Trades Association, which is conducting the show. Statuary, wall paintings and other artistic decorations have been prepared by Leo Lentelli and A. Berghesi, of Panama Exposition note.

The three states have shown substantial gains in practically all products and industries, in highway development and in the purchase of utility cars. In New Mexico, for example, about 200 cars have been bought this year for stage lines to carry passengers, express and freight, and it is estimated that fully two-fifths of all the cars there are used entirely or largely for business purposes.



View of the show at Denver, at which more than 100 cars were exhibited by forty dealers

The Readers' Clearing House

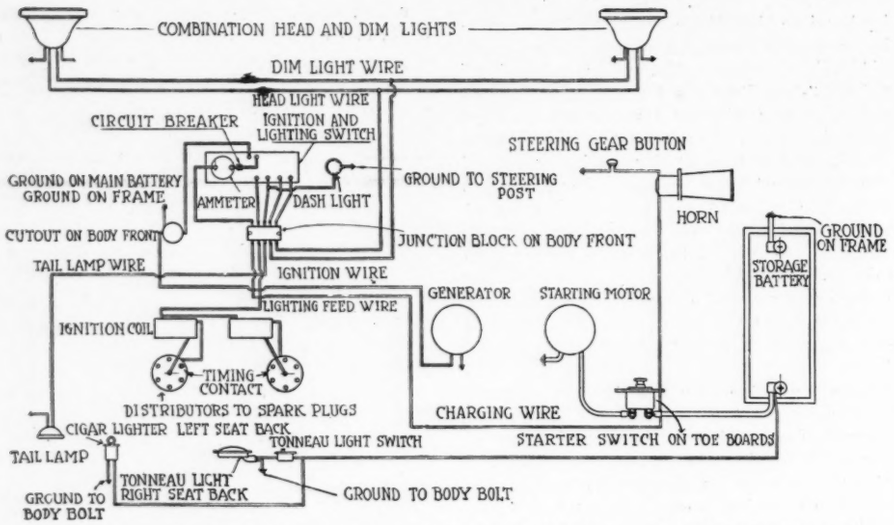


Fig. 1—Diagram of the electric system on a twelve-cylinder car, showing connections to cigar lighter, etc.

The Electric System

Wiring Twelve-Cylinder Car

Q.—SHOW a wiring diagram similar to that used on the National twelve-cylinder model. I want to use double-bulb headlights, cigar lighter, tonneau light, etc.—A. J. Shopen, St. Louis, Mo.

A diagram showing the general layout for such a system is shown in Fig. 1.

Automatic Advance on Bosch

Q.—Does the Bosch magneto have an automatic advance and how is it set and timed?—Mitchell D. Vail, Fort Sam Houston, Tex.

The Bosch magneto is not made with an automatic advance by the company operating in this country. A few with automatic advance were built by the foreign company, but for foreign service only.

Spotlight on 1917 Maxwell

Q.—How can a spotlight be installed on a 1917 Maxwell without turning on all the lights?—F. L. Brooke, Culver, Ind.

To connect a spotlight on this car you can connect one wire of the light on the horn terminal of the fuse block. The other wire runs from the light to a ground connection. The circuit will be completed and the light burn when the switch, usually incorporated with the light, is closed. A wiring diagram of the connections for the light is shown in Fig. 5.

Changing Low-Tension Ignition

Q.—Would it be advisable to take off a low-tension magneto and use Atwater-Kent system? Would there be any changes necessary, or could it be placed where the present magneto is connected? This is on a Flanders 20.—T. Manley, St. Louis, Mo.

We believe that you would be better off by substituting an Atwater-Kent system for the low-tension outfit. You can use the Atwater-Kent distributer in the same place occupied by the present magneto, as the former comes with what is known as a magneto type of base.

Ammeter on Interstate 40

How can I connect an ammeter to a model 40 Interstate five-passenger car?—F. Savage, Gainsville, Tex.

To connect an ammeter on this car cut the wire D-1 to generator in front of dash, splice out to ammeter and return to the generator post. It is advisable to use a 75 ammeter on both the charge and discharge. While the generator charging rate is only 20 amp., the torque on starting is greater and in some cases runs as high as 80 amp. It is hardly necessary to use a 75 ammeter except for convenience in starting on account of this torque. The connections for the ammeter are shown in Fig. 3.

Direct Current for Charging

Q.—I have access to a direct-current generator, so could charge my 80 amp. storage battery whenever this became necessary. It operates on a 110-volt direct current. Would this current be all right? Show diagram how the connections are made and what apparatus is necessary.—Daniel Jaeger, Chicago.

As long as you have direct current there is no need for a rectifier, inasmuch as direct current is used charging batteries. You will need a switch, fitted with a fuse block and a lamp bank, connecting the lamps as shown in Fig. 2. The purpose of the lamps is to step down the current or varying it for proper charging. The more lamps you use the less will be the charging rate. The lamps used for charging are either 16 or 32 cp. carbon filament. One 32 cp. lamp allows 1 amp. to pass to the battery at 110 volts. For an 80-amp. battery the finishing rate is 5 amp. Therefore this battery will require five 32 cp. lamps or ten 16 cp. lamps. Be sure that you connect the positive terminal of the battery to the positive terminal of the generator.

Trouble in Starter Switch Box

Muskogee, Olka., Editor MOTOR AGE—I note the inquiry of Hugh C. Russell, Keams Canon, Ariz., in the Oct. 11 issue. This type of Maxwell has a Simms high-tension magneto with dry cells to use for ignition. When the starter pedal is pushed down there is a small spring which makes contact and only the No. 1 and No. 4 cylinders fire on these batteries and the contact spring is still making contact, so the troubles lies in the starter switch box.

I have had several Maxwells come in with this trouble and this is where I find it most times, if no wires have been molested as he states and to change the wires on the breaker box cover, it has the same effect sometimes, and other times it will not start at all.

If he could get a wiring diagram of a 1916 Maxwell, or take it to some Maxwell service station, he can more than likely understand better than I have explained this.—E. H. Holmes.

A wiring diagram of this system is shown in Fig. 4.

Miscellaneous

Gear Ratios on Stutz and Marmon

Q.—What are the total gear reductions on first, second, third and reverse on the Stutz and Marmon cars?—James S. Hardy, Sacramento, Cal.

The 1918 Stutz uses four different rear axle gear ratios as follows: 13-49, 14-49, 15-49, and 16-49. The reductions through the gearset are as follows: low gear, $\frac{3}{8}$ to 1, intermediate, $\frac{5}{8}$ to 1, reverse, $1\frac{3}{32}$ to 1, and direct drive on high.

The standard total gear reductions for the Marmon are as follows: direct 3.69 to 1, second, 6.01 to 1, first, 12.4 to 1 and reverse, 15.94 to 1.

Replacing Magneto with Disk

Q.—Are the main bearings of the Ford engine of sufficient size to permit the removal

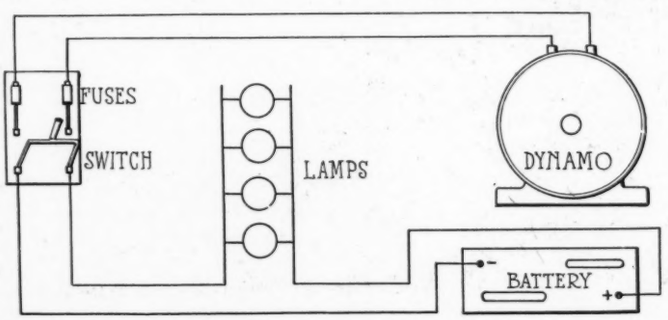


Fig. 2—This illustration shows the conventional way of charging a battery from a direct-current

of the built-in magneto, setting in its place a steel disk of the same thickness?

2—If the regular type of bearings is not, what kind of main bearings should be used?

3—Would the change unbalance the engine? The object of the change would be to increase the weight of regular flywheel and at the same time remove the resistance of the magnets revolving through the oil of crankcase.—J. H. Koontz, Junction City, Kans.

1—Yes. These bearings are of such proportions that they are able to withstand quite an overload. But the fitting of a disk like you mention would not be so heavy as to produce any great amount of strain on the crankshaft bearings.

2—The type of bearing is all right, but if you want to play safe make the disk thinner so it will be of the same weight as the magneto parts you take off.

3—This would have no effect upon the balance of the engine. So far as the resistance of the magnets in the oil is concerned, this is but slight. Remember also that when the car is running in high gear the transmission revolves as a unit with the engine and acts as an additional flywheel. This is probably one of the reasons why the company makes the flywheel lighter than those on other engines of about the same capacity.

Valve Timing of Peugeot

Q.—Give the valve timing of Peugeot racing engine driven by Resta in 1915 at the Chicago speedway? What is the bore and stroke of the engine?—Joe M. Ragagli, Chicago.

The inlet valve opens 10-12 deg. after top center and closes 45 deg. after bottom center. The exhaust valve opens 45 deg. before top center and closes 18 deg. after top center. The bore and stroke of this engine are 3¾ by 4 in. respectively.

Repainting Tarnished Rims

Q.—I wish to repaint my aluminum painted rims, which have tarnished, with black paint. If I apply a metal paint drying with a gloss finish, what other treatment would be necessary? Should I sandpaper the rims before painting and would any priming or varnish coats be necessary? In retouching with such a paint, would varnish have to be mixed with it? —George A. Ormerod, Miami, Fla.

Sandpaper and wire brush rims to remove any rust and dirt that may be present. Refinish with a good black technical paint.

Differential and Lock Levers

Q.—What is the principle of the Bailey nonstall differential?

2—Explain the full use of the center differential and lock levers on the F. W. D.—Mitchell D. Vail, Fort Sam Houston, Tex.

1—This was described in the Oct. 25 issue of MOTOR AGE.

2—The differential is mounted on two roller bearings supported in the axle housing. There are two adjusting nuts on each differential bearings, by which the differential may be adjusted in relation to the pinion shaft. This adjustment is locked by means of lock dogs and should be altered only by an experienced mechanic.

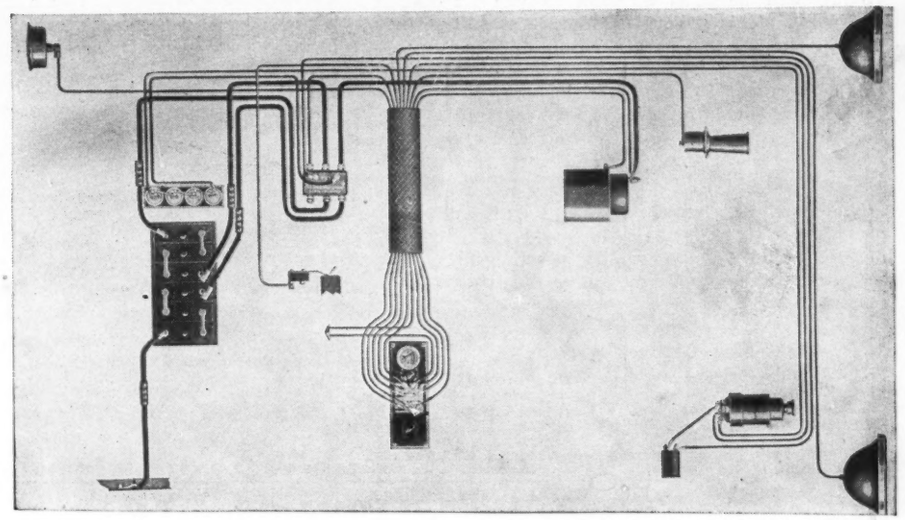


Fig. 4—Wiring diagram of the 1916 Maxwell

Repairing Mercer for Races

Q.—I have a Mercer raceabout 1914 model, with engine 4⅜ by 5 in.; tires 32 by 4. I should like to know how to prepare this machine to perform in the best possible manner on the local race track, which is 2¼ kilometers, oval shape, unbanked and with one of the ends rather sharp.

In using the stock gear of the Mercer, 2¾ to 1, I found them too high for the track. I then secured a 3 to 1 set, which I also found rather high. Next I installed a 3½ to 1 set and found that for short distances I could get up to 63 or 65 m.p.h. However, with this gear and at this speed the engine turns up at such a high rate that I encountered trouble from overheating.

Arrangements are now being made to bank the curves of this track and in a few months' time some races are to be held; distance will be around 200 miles. Meanwhile, I want to get my car in the best possible shape. It has occurred to me that with the banked curves I should be able to use the 3 to 1 gearing, and probably the best thing that I could do would be to install a set of special light pistons, with Burd rings. I have been advised by an engineer that the usual light piston made of aluminum is not safe over 4 in. bore, that it would be best to have them made of semi-steel. Perhaps some form of liners could be inserted to give rigidity to the piston walls. About what clearance should be allowed? About what would this kind of pistons cost together with wrist pins and rings?

Could you give me a sketch showing the most efficient timing I could use for high-speed work? At this high altitude cars lose from 10 to 20 per cent of their power, the Mercer raceabout of this model, Series J, has not the compression of the Mercer touring car of the same model. In making new pistons this should be figured, with the idea of making up somewhat the loss experienced in this direction at this altitude.—H. Geoffrey Fletcher, Mexico City, D. F.

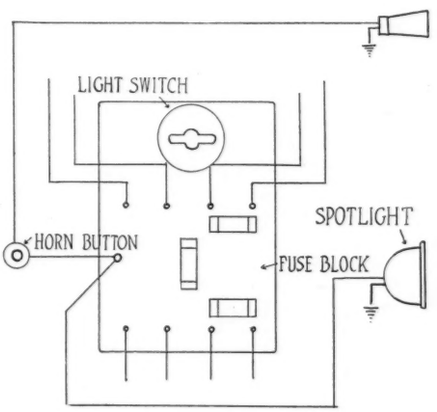


Fig 5—How a spotlight can be connected on a Maxwell

The 3 to 1 gear ratio should be about right for a track which is so banked that you do not have to shut down materially on the curves.

Regarding the aluminum pistons, if these are used they should be made with suitable ribs on the interior to give rigidity. Aluminum pistons require careful workmanship both in their construction and fitting and for best results this should be left to concerns making a specialty of this kind of work.

If you do not care to go to the expense of aluminum pistons try the semi-steel kind. Some very good results have been obtained with these and you have a greater factor of safety and very little experimenting to do to get them light. The amount of clearance which should be allowed will depend altogether on the characteristics of the material and the number of rings. The clearance of course should be a taper and will be around .015 at the top. It is impossible to predict what pistons of this nature would cost, but you would be able to have them done for around $75, for a set of four.

Regarding timing, it would be better to work this out experimentally than to attempt to set down a figure on paper.

Unless you change your camshaft, your

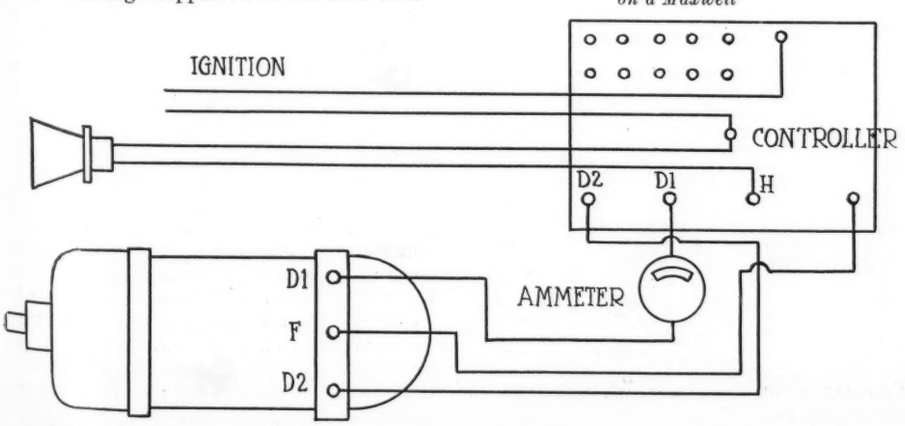


Fig. 3—To connect an ammeter on an Interstate 40, the wire from the terminals D1 is cut

timing will be fixed as soon as you fix one point. This governing feature should perhaps be the exhaust opening and for high-speed work it would be well to let this come about 50 deg. below bottom center. This could be used as a starting point and you could test different timings from the results that you had with this first setting.

The greatest change in racing cars is probably taking place in the valve drive and it would not be readily possible to change your Mercer very much in this respect.

Tightening Connecting Rods

Q.—What is the most dependable method of tightening the crankshaft and connecting-rod bearings; scraping and fitting, or burning in? If burning in, is it better that the crankcase be full of oil so all bearings be thus perfectly oiled while driven and run to free condition, or may they be run dry?

2—It seems to me that the weight of the pistons should be exactly alike in order to balance and reduce vibration. Should this include the connecting rods or is it sufficient that it be just the pistons with rings? Where should the metal be taken off to true the overweight rods?—William M. Walsh, Denver, Col.

1—The best way to adjust connecting-rod bearings is by scraping the high spots carefully after an application of Prussian blue. This process is repeated until the entire surface of the bearing shows that all of the high spots have been removed. The high spots are those where there is no color. When testing the bearing the nuts of the connecting rods should be set up just tight enough to eliminate any play. Then gradually as the metal is scraped away the cap can be drawn up tighter. It is slow work and requires several hours to do a good job.

2—All of the pistons should be of the same weight, in order to reduce vibration. This is also true of the connecting-rods and wrist pins. In order to get the connecting rods to weigh exactly the same you can rig up a device like that shown in Fig. 7. This consists of a wooden support with two notches cut in the top for the wrist pin to rest in. The big end of the rod rests on the platform of a scales, as shown and in this position the scales should be read. Do the same with each rod, keeping the wooden support the same distance from the scales. The weight of the big end of the connecting rod is more important than the piston pin end and this method of weighing the rods insures a better distribution of the weight. If any metal has to be removed from the connecting rods, take it from the crank end, either by filing, or drilling holes in the web.

TO assist readers in obtaining as a unit all information contained in this department on a certain subject in which they may be most interested, such as ignition, carburetion, etc., MOTOR AGE has inaugurated the segregation of inquiries into classes of allied nature. Questions pertaining to cooling will be answered under that head and so on.

THE ELECTRIC SYSTEM

A. J. Shopen.....St. Louis, Mo.
M. D. Vail....Fort Sam Houston, Tex.
F. L. Brooke.....Culver, Ind.
T. Manley.....St. Louis, Mo.
F. Savage.....Gainsville, Tex.
Daniel Jaeger.....Chicago
E. H. Holmes.....Muskogee, Okla.

MISCELLANEOUS

J. S. Hardy.....Sacramento, Cal.
J. H. Koontz.....Junction City, Kan.
J. M. Ragagli.....Chicago
G. A. Ormerod.....Miami, Fla.
W. M. Walsh.....Denver, Col.
M. D. Vail....Fort Sam Houston, Tex.
H. G. Fletcher.....Mexico City, D. F.
J. F. Buck.....Morris, Ill.
M. Salmond.....Grand Rapids, Mich.
T. Manley.....St. Louis, Mo.
H. H. Bailey.....Alton, Ill.
W. Gilbert.....Pueblo, Col.
F. L. Brooks.....Culver, Ind.

ENGINES

M. D. Vail....Fort Sam Houston, Tex.
A. H. Denton.....El Paso, Tex.
C. Ruff.....Tomnolen, Miss.
T. Manley.....St. Louis, Mo.
J. H. Kendall.....Chicago
W. M. Walsh.....Denver, Col.

REBUILDING

W. M. Thompson.....Madison, Wis.
W. M. Johnson.....Detroit
T. Gaffey.....Rock Falls, Ill.
C. T. Bailey.....St. Louis, Mo.
J. H. Hunter.....Rock Island, Ill.

No communication not signed by the writer's name and address will be answered in this department.

Ball Bearings on Engines

Q.—Why are not ball bearings used on a larger number of engines for main and connecting-rod bearings?—Mitchell D. Vail, Fort Sam Houston, Tex.

Ball bearings have been used in racing car engines for main bearings for a number of years. The installation of these is rather difficult and most engineers do not believe that the advantage gained warrants the expense.

No Record of This

Q.—What is the stock car record for a quick getaway?—J. F. Buck, Morris, Ill.

3—We have no records pertaining to this.

Gear Ratio Specification

Q.—What is the gear ratio of the Hudson speedster?—M. Salmond, Grand Rapids, Mich.

This model has been supplied with various ratios, but 4 1/12 to 1 seems to be accepted standard at present time.

His Valve Stems Chatter

Q.—How can the valve stems be fixed so they won't make a chattering noise?—T. Manley, St. Louis, Mo.

The chances are the valve stem guides are worn to such an extent that the valves chatter when the engine runs. This you can overcome by reaming out the guides and fitting valves with over-size stems.

Increasing Speed of 1912 Velie

Q.—I have a 1912 Velie 40 hp., which is fitted with a racing camshaft, bronze bearings, etc., which was used for racing on St. Louis tracks in 1914. The racing carbureter has been replaced with a 1-in. carbureter and the strong springs and high gearing has also been replaced. Would a larger carbureter give more power and speed? Would stronger valve springs give more speed? If valve plunger roller is replaced with mushroom type will it furnish more power and speed? How much can the valve opening be enlarged? Will flat-headed valves give more clearance? Where can I get valves? Can connection rods be drilled? The weight is 2¼ lb. each. Can I drill pistons, weight 5¼ lb.? Can I use lighter wristpin, weight ¼ lb.? Explain how much lighter these parts can be made. Will two rings properly fitted give as good a result as three? Can magneto be taken off and replaced with generator with good results, using a distributor alone? This car has been lowered, making straight-line drive. Can I take off the universal joint next to axle, and, if not, can I replace these joints with leather ones?—Hugh H. Bailey, Alton, Ill.

You do not state how fast the car can travel with the present carbureter, but if the racing carbureter has been replaced, it is likely that it was somewhat larger than the 1-in. instrument. You will get more speed and power from a larger carbureter. It is customary to fit stronger springs on valves used for speed work, to insure rapid seating of the valve. We believe you will be better off with the valve plunger roller.

To tell how much the valves and ports can be increased it will be necessary to remove the cylinder head and see how much stock is left around them. Usually about ⅛ in. is all that the average valves can be increased. Flat headed valves give no more clearance and they are not as strong as the other type. You can get valves from the Rich Tool Co., Chicago, Lewis Electric Welding & Mfg. Co., Toledo, Ohio, and the Steel Products Co., Cleveland, Ohio.

You can drill the connecting rods to lighten them as shown in Fig. —; but be careful not to remove so much metal that the rods will be weakened. The boring of holes in either the pistons or rods is of no importance unless other things are done to the engine to take advantage of lightening the reciprocating parts. For instance, there is no use making the pistons and connecting rods lighter with the idea that

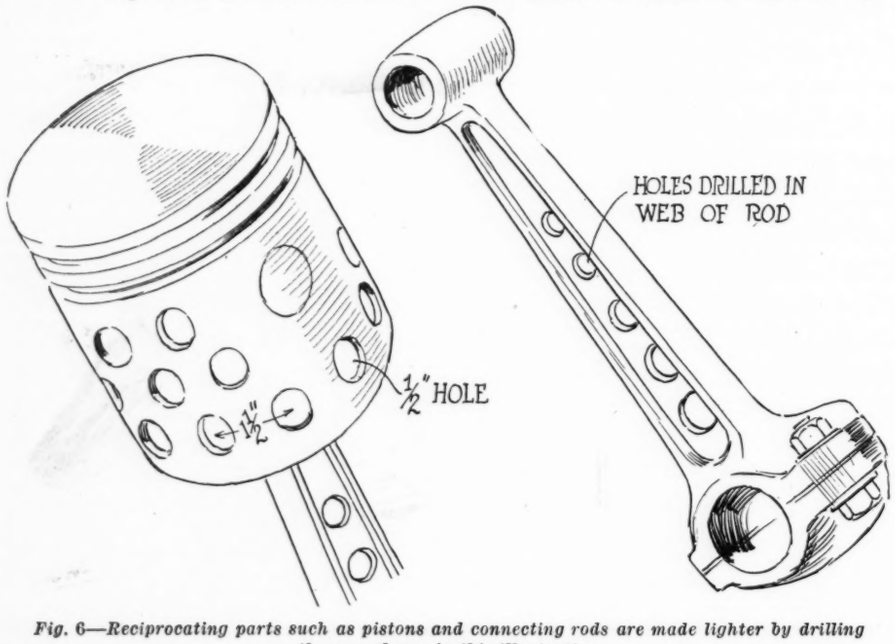


Fig. 6—Reciprocating parts such as pistons and connecting rods are made lighter by drilling them as shown in this illustration

they will travel faster, if the valve ports, intake manifold, carbureter, etc., are not capable of handling the gas faster also.

In drilling holes in pistons it is common to make them ½ in. in diameter. Either two or three rows are drilled, depending upon the length of the piston skirt. It is usual for them to have a pitch of about 1½ in., that is, the centers of the holes are 1½ in. apart. The rows of holes should be staggard, as shown in Fig. 6. In doing the work care must be taken not to crack the metal of the piston walls. Fill up the inside of the piston with lead or make a block of wood to fit within it. This will relieve the pressure of the drill. In a piston of about 3½ in. diameter twenty-four holes can be made. We do not think that you will gain much by making the wrist pin lighter. In fact, we would suggest that instead of running the risk of making the parts too light, you get in touch with some of the makers of aluminum-alloy pistons and install a set of these pistons in your engine if you want speed.

Two well fitting piston rings are better than three improperly fitting ones. If you intend to fit some of the patented forms of rings it is necessary to put in one only to a piston, placing it on top. The remaining rings can be of the conventional type.

You can take off the magneto and substitute a battery ignition system using a non-vibrating coil and elevated distributor. Some of these systems come with a magneto type base, so all the owner has to do is fasten it in place on the same bracket or support that held the magneto. The beauty of these systems is that they require very little power to drive them and generate a spark of the same intensity regardless of the speed at which the engine is running.

So long as the car has been changed to straight-line drive we believe you could run without the universal on the rear axle, providing you can make a satisfactory coupling of the driveshaft.

Gear Reductions in Buick B-55

Q.—What is the gear ratio in high, in second and in low of a 1914 Buick, B-55?—William Gilbert, Pueblo, Col.

In low the reduction in the transmission is 3.36 to 1 multiplied by the 4 to 1 ratio of the bevel ring, which makes 14.44 to 1; in second the transmission reduction is 2.23 to 1 multiplied by the ratio of the differential, or 8.92 to 1. In reverse the ratio in the transmission is 4.32 to 1 multiplied by the ratio of the differential this becomes 17.28 to 1. In high gear, there is a straight drive through the transmission without reduction, thus giving only the rear axle reduction of 4 to 1.

Where Are Sunbeams?

Q.—A little over a year ago I saw two Sunbeam racing cars on the Chicago Speedway one of which was driven by Christiaens Can you tell me where these cars are, if they are still in the country, and addresses of the respective owners, and whether they are for sale?—H. Geoffrey Fletcher, Mexico City.

MOTOR AGE is under the impression that the two Sunbeam racing cars were shipped to England not very long after their appearance on the Chicago track.

Here's a Suggestion Worth While

Culver, Ind., Editor MOTOR AGE—A suggestion that perhaps has not occurred to

Experience Meeting

What Was Your Experience with Fuel Energizers?

MANY readers would like to know whether the fuel "dopes" designed to increase mileage of gasoline and remove carbon are really worth while. You who have tried any of the pellets, powders or liquids for the purpose will help many other readers by telling us how they worked out. In writing, tell the name of the energizer, the quantity used, the number of gallons of gasoline treated, what mileage per gallon you were getting before using it, what mileage you got with it, what changes were made in the carbureter adjustment, etc. Also the general effect in the running of the car, as to pulling, starting acceleration, etc. Also its effect as a carbon remover.

This will be used with your signature or not as you prefer, but in every case the letter must carry full name and address.

motor car users may be of interest to you. It is as follows: In my garage I have a

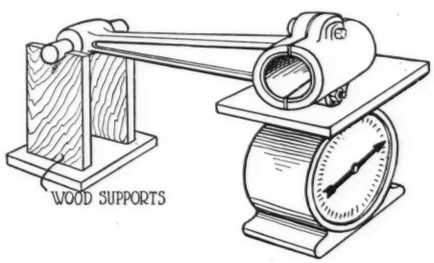


Fig. 7—How connecting rods can be weighed for balancing

flat tool chest fastened to the wall. It is a case perhaps 6 in. deep and about 3 by 3 ft. in size. The door of this chest provides an excellent bulletin board upon which I tack any suggestions about my car that I run across in MOTOR AGE. If you file the numbers away, some day you will recall having read something that you need right away. By referring to the bulletin board in your garage you have the information immediately. This can be done anyway by tacking such items on the wall in the garage. I have never seen it done, however, and the idea perhaps has not occurred to most car men.—F. L. Brooks.

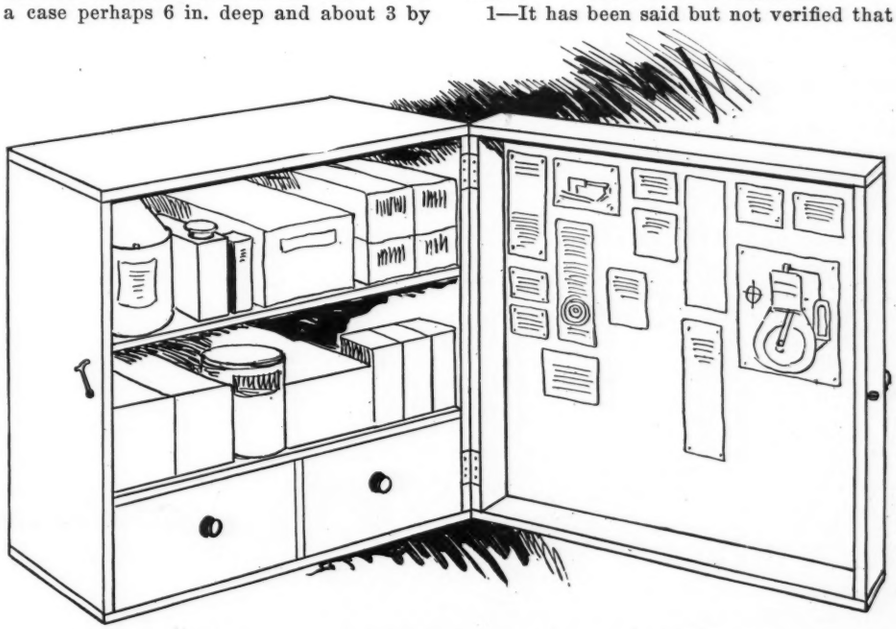


Fig. 8—One reader pastes Motor Age suggestions relating to the model he drives inside the door of his supply cabinet

Engines

Spark Position for Maximum Power

Q.—Explain position of the piston when the spark occurs to obtain maximum power.—A. H. Denton, El Paso, Tex.

2—The piston would be from 20 to 25 deg. from upper dead center when the spark occurs for maximum power output.

Power Derivation of Engine

Q.—How is the power derived from the Cleveland aero-engine?—Mitchell D. Vail, Fort Sam Houston, Tex.

In this engine the axes of the cylinders are parallel to the propeller shaft and the connecting rod is attached to an individual crank, on the opposite end of which is mounted a pinion meshing with a bull gear on the propeller shaft. This particular engine has six cylinders, all of which are connected to the bull gear as described, the gear reduction being 2 to 1.

Size of Rings on Flanders 20

Q.—What is the size piston rings used in the Flanders 20 engine, diameter and width?—T. Manley, St. Louis, Mo.

The size of the piston rings in this engine is 4 by $\frac{3}{16}$ in.

Horsepower of Liberty Engine

Q.—I saw a statement in MOTOR AGE that the Liberty engine, or some airplane engine, develops 1 hp. for each 1¾ lbs. weight. What is the weight and horsepower of this engine and number of revolutions per minute?

2—Is the low weight per horsepower due to the great cylinder capacity?

3—Will you be allowed to give a complete description in MOTOR AGE, giving thermal efficiency or amount of gasoline per horsepower required?—Clyde Ruff, Tomnolep, Miss.

1—It has been said but not verified that

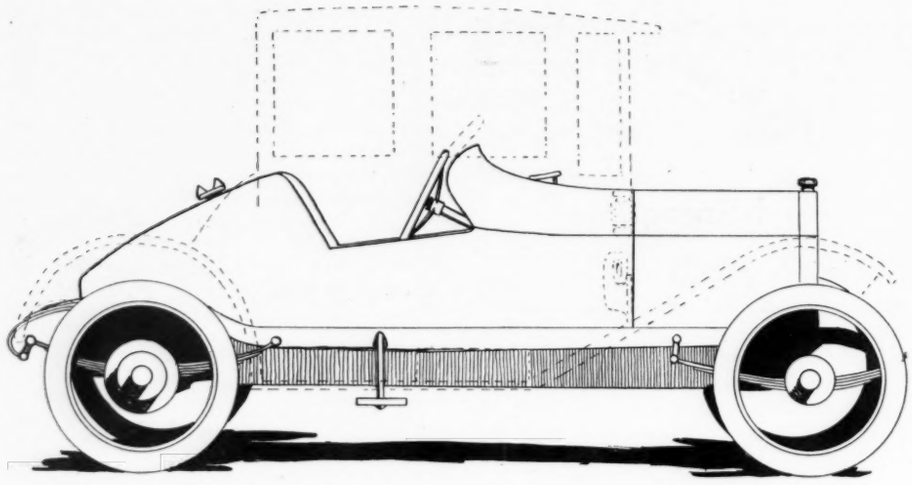


Fig. 9—How a 1912 Chalmers can be converted into a speedster. The same radiator and hood are used

the Liberty engine develops 1 hp. for about 2 lb. of engine weight.

2—The low weight per horsepower can be attributed to excellent design, the use of high grade materials and good manufacturing methods.

3—This information is not available at the present time.

Mistake in Engine Timing

Q.—In the article entitled Timing the Engine of a Ford, Sept. 27 issue, there appears a table showing the relative events of the cycle of the four-cylinders. There seems to be a mistake in the statement. Should not the events under cylinder No. 3 be reversed with those under cylinder No. 4?—J. H. Kendel, Chicago.

An error was made in setting up this table. A correction was published in MOTOR AGE, issue of Oct. 25.

Number of Cycles

Q.—Is the Stutz a two-stroke or four-stroke cycle?

2—Which is the best, a two-stroke or four-stroke cycle for any make of motor car and of what advantage?—James S. Hardy, Sacramento, Cal.

1—The Stutz uses a four-stroke cycle engine.

2—The possibilities of the two-stroke cycle engine are many but it has not been developed to such an extent as the four-stroke cycle engine for motor car powerplants. The efficiency of the two stroke is not as good as that of the four stroke in its present stage of development and probably accounts for its lack of favor among engineers.

Engine Uses Too Much Oil

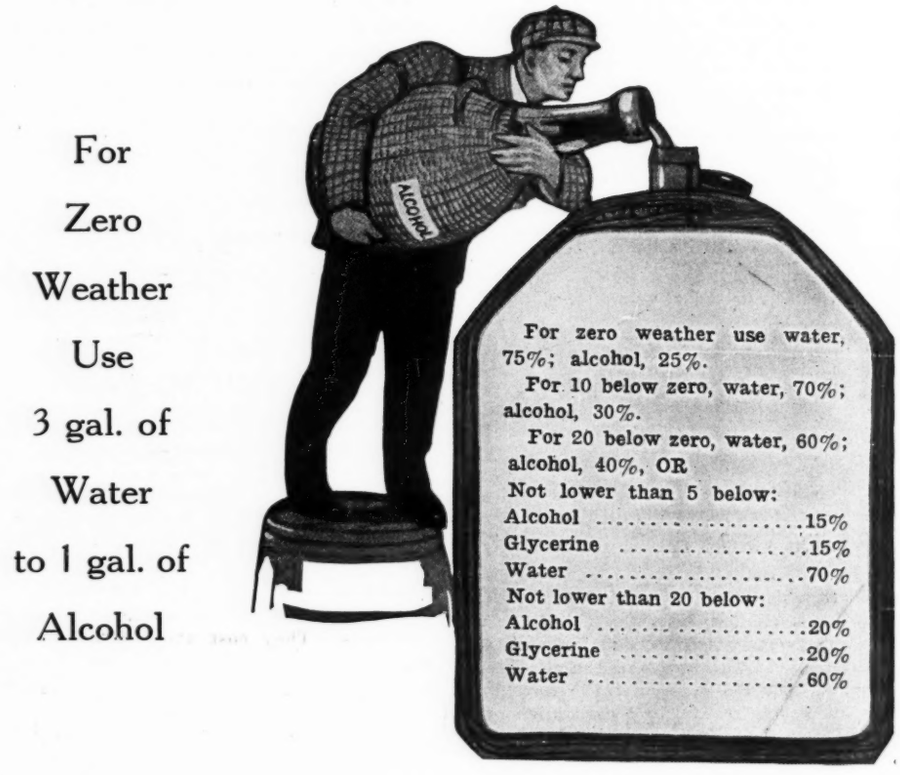
Q.—Ever since I had my engine overhauled, cylinders rebored and new pistons put in, it passes oil so badly as not only to use more than double the quantity previously used, but it carbonizes badly. The compression is fine, seemingly a perfect fit of pistons or rings and splendid power. What is the cause and what is the remedy? Is there a right side up of piston rings that, if not right in this case, could cause the pistons to pump oil? If so, what is the right way, and why?

I have been told the only way to cure it is to lap in oversize pistons to assure perfect fit. How can a larger piston be inserted when the cylinder must have been worn only below the top and evidently mainly below the middle or at least about the middle? How is it done? Is it best to have the cylinders ground true first and then lap in the pistons?—William M. Welsh, Denver, Col.

Not a few owners state their grievance as excessive smoke due to the lubricant making its way above the piston rings and supplement their complaint by saying that only recently new rings were fitted. That new rings were fitted is no indication that the engine should not be smoky. How were the rings fitted? Should the rings bind on one side in the groove and the other side compress, there is a space left for the oil to get past the ring. If the rings were replaced with the ends in line, the oil no doubt will get to the top of the piston and onto the plugs, causing also excessive carbon deposit.

Pistons and rings to give good service should be lapped in. This process consists of grinding the ring on a level metal plate previously sprinkled with emery powder and water. A block of wood is placed over the ring and the latter carried back and forth on its side across the emery. When fitted it should move around freely in its guide and yet not show any up or down play. The ends should not touch, the usual clearance at this point being .015 in., but this varies with different makes of engines. Although the pistons may be true and the rings well-fitted a worn cylinder may cause excessive clearance and thus permit oil to get above the rings.

Before new pistons are lapped in the cylinders should be ground true. Cylinders that have been in use for a long time wear oval and this must be corrected before attempting to fit new pistons. We sug-



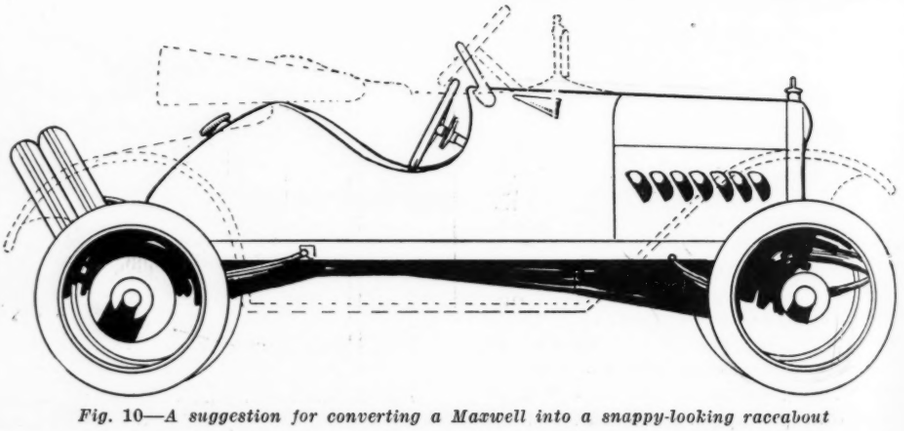


Fig. 10—A suggestion for converting a Maxwell into a snappy-looking raceabout

gest that you measure your cylinders with calipers and micrometers to see if they are not out of round.

Rebuilding

Converting Buick Into Phaeton

Q.—Give suggestion for converting a model 45 Buick into a four-passenger phaeton such as marketed by the Cadillac Co. Show extra wire wheel carrier.—W. M. Thompson, Madison, Wis.

In Fig. 12 is shown a model 45 Buick fitted with a body like you suggest. You could arrange to carry extra wire wheels as shown, incorporating the lower brackets with the gasoline tank supports.

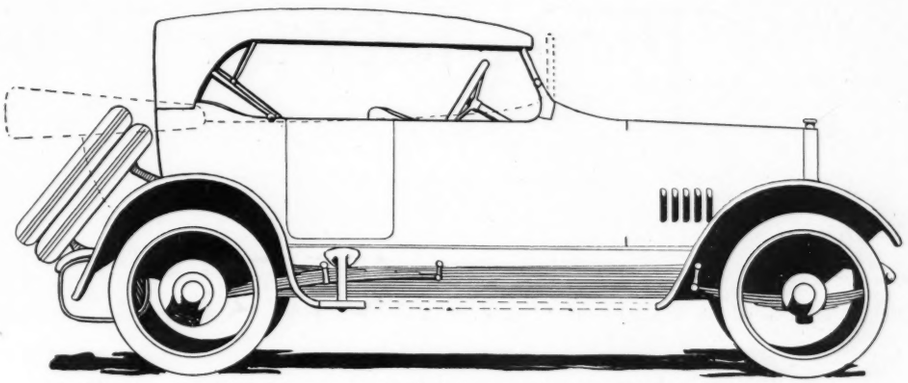


Fig. 12—A model 45 Buick converted into a four-passenger phaeton. The tire carrier and tank brackets are integral

Rebuilding a 1916 Maxwell

Q.—Show a sketch for converting my 1916 Maxwell into a sport car without fenders.
2—Furnish a suggestion for a vacuum feed; that is, with gas tank in rear.—W. M. Johnson, Detroit, Mich.

1—A suggestion for this is shown in Fig. 10.

2—To install a vacuum feed it is necessary to place the vacuum tank on the engine or dash in such a way that the bottom of it will be above the top of the carbureter. It is immaterial where you put the tank, so long as the above conditions are realized. The main supply tank can be located in the rear and a feed pipe run from it to the top of the vacuum tank. This long feed pipe must be properly supported at various points on the frame with metal clips.

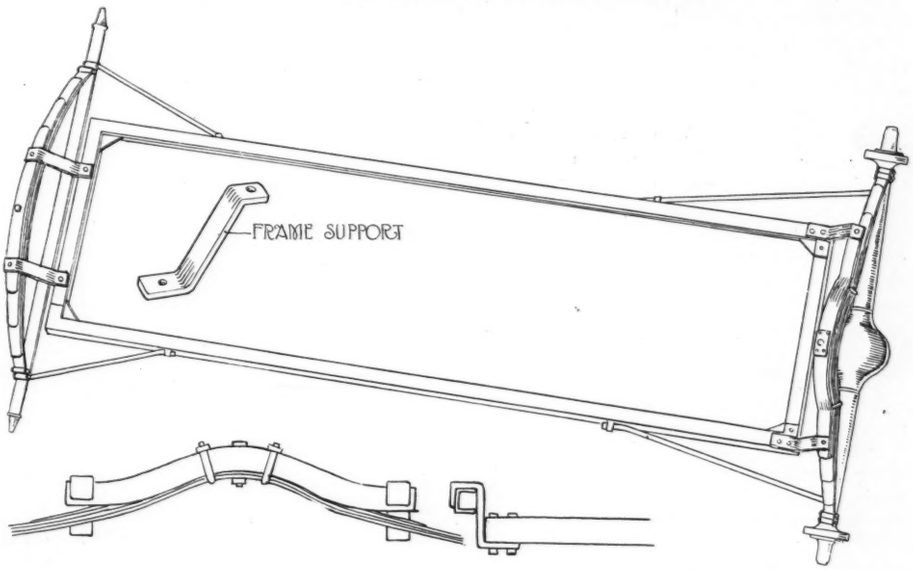


Fig. 13—Suggestion for lowering the frame on a Ford car

Rebuilding for Speed

Q.—I am building a Ford racer with which I expect to do a mile-a-minute, by using the regular magneto and a Sunderman carbureter and underslinging. What gear ratio should I use, and where can I get gears? Give names of makers.
2—Would it pay to change the Ford magneto? What would a high tension magneto cost? Would it make it faster than the regular magneto?
3—Where can I get parts or patterns for underslinging a Ford? Could MOTOR AGE publish such designs?
4—Where can I get pattern of a low racing body? Could MOTOR AGE publish such a design also?—Tom Gaffey, Rock Falls, Ill.

1—In order to get the speed you mention it will be necessary to use a ratio of about 2.5 to 1. You can get gears of this ratio from the Detroit Gear and Machine Co., Detroit, or the Illinois Gear and Radiator Co., Chicago. Most of the accessory houses carry these gears in stock.

2—As long as you want the car for racing, we believe it would pay you to change the flywheel magneto, inasmuch as it takes the current longer to build up in the regular Ford type of coil ignition. A high-tension magneto would be better for all around results but equally well would be one of the battery types of ignition using an elevated distributer and non-vibrating coil. These systems require little or no power to drive them, as the source of current is taken from a storage battery or dry cells. They cost about $22, while a high-tension magneto costs approximately $40.

3—MOTOR AGE has from time to time published suggestions for lowering the frame on a Ford car and one of these is shown in Fig. 13. You can also get specially-shaped brackets for this which require cutting the side frame members at the rear. These brackets are made by W. Dominick, 1607 Prairie avenue, Chicago.

4—Various forms of speedster bodies have appeared at different times in the Reader's Clearing House. One of these, which shows a Ford redesigned with a racing body, is shown in Fig. 11. There are concerns which make a specialty of this kind of work and we suggest that you get in touch with the following: Wright, Cooler & Hood Co., 1253 Michigan avenue, Chicago; Auto Remodeling Co., 1501 Michigan avenue, Chicago; Auto Sheet Metal Co., 2301 Wabash avenue, Chicago; Peoria Accessory Co., Peoria, Ill.; Lehman Mfg. Co., Cannelton, Ind.; Columbia Auto Body Co., Detroit; A. J. Monday Co., Milwaukee, Wis., and Millspaugh & Irish, Indianapolis, Ind.

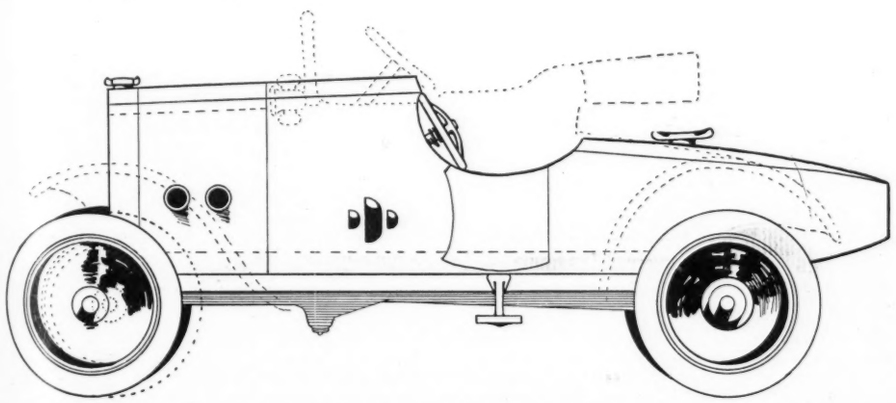


Fig. 11—This is not a Fiat, but a Ford converted for racing work. The radiator is of extra large capacity

Chalmers Coupe to Speedster

Q.—Show sketch for changing 1912 Chalmers coupe to a speedster, using the same hood, radiator and gas tank.—Charles T. Bailey, St. Louis, Mo.

A suggestion for this is shown in Fig. 9. The dotted lines are those of the original body. There are no running boards or fenders, simply a small step. Provision is made to carry the gasoline under the rear deck. In order that the body might be stronger, it is best to make it without any doors.

The Motor Car Repair Shop

Lessening Fire Hazard

PROBABLY every car owner now and then asks the question "What if my car should catch fire?" This subject is the least heeded and yet one of the gravest dangers with which car owners have to cope. Not that cars have a habit of burning up, but motorists get careless and refrain from taking little precautions for the avoidance of mishaps. Unlike some accidents, gasoline fires give little or no warning; they come when least expected. There are no symptoms to tell that something is going to happen, as might be the case with a tire that is about ready to blow. When you put your car away for the night in the garage or barn, do you do so with a clear conscience that you have done all you can to minimize the danger from fire? If not here are some suggestions:

1—First of all have a fire extinguisher and keep it in a handy place on the wall of the garage. If you have one of them it will lessen the insurance rate, besides giving you protection. Many owners carry extinguishers on their cars and a good place for them is on the front seat rizer.

2—Do not let any oily rags or waste lie about in the garage. Sweep the floor often, it will prevent spreading of flames should there be a fire under the car. Also keep the engine clean and especially the sod pan. See if there is a hole in this pin under the carbureter drip, if not, by all means put one there.

3—Never fill the gasoline tank with the engine running, or while the lights are burning, if the latter are gas or oil lamps. If your tank is under the cowl examine it often for leaks, in fact, go over all of the gasoline connections occasionally.

Gasoline Shut-off

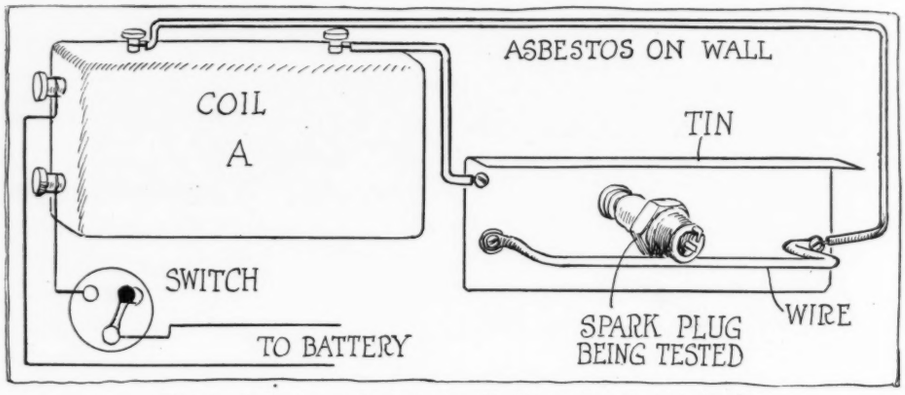
4—Install a gasoline shut-off where you can get at it easily. It is a pity that so many shut-offs are located under the car where they are hard to get at. If the garage is heated by a stove, shut off the gasoline before leaving. If there is no strainer on your car, put one on and draw off the liquid in the sediment bulb at least once a month.

5—It is bad policy to keep flooding the carbureter if the engine does not start readily. This is wasteful of fuel for one thing, increases the danger of fire, and makes starting all the harder. Prime the engine, if you have a primer, otherwise use the priming cups or remove the spark plugs. See that the mixture is not too rich. Too much carbon causes an engine to heat. Look to the carbureter occasionally. It might get out of adjustment. Do not keep running the engine if it begins to backfire. There is a reason for it and this must be found, as the trouble will not be corrected of its own accord.

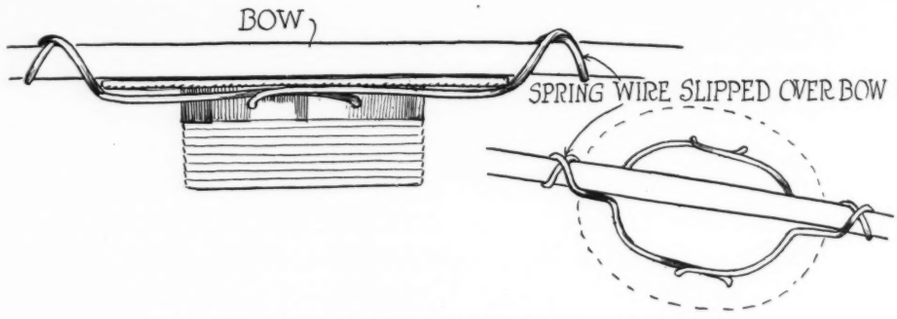
6—Not only must the gasoline system be watched, but the ignition and electric system as well. Keep all connections tight; loose wires or a grounded wire might cause trouble. If you clean the engine with a brush use one that has no metal binding on it for the latter might cause a ground or short-circuit, should the car have a one-wire system, and the spark produced might set fire to the brush if the latter has been dipped in gasoline for cleaning.

7—A Moto-Meter is a good thing to have on the radiator cap. It tells you if the engine is getting hot through excessive carbon deposit, lack of oil, tight bearings, insufficient water, or some similar trouble which in time might start a fire.

8—Should a fire ensue shut off the gasoline if possible and start the engine. If you can, speed it up, this will soon drain whatever fuel is left in the carbureter. Keep a bucket of sand in the garage for emergencies like this. You can throw the sand at the base of the flames and in most cases check the fire before it gets too much of a start. If you have an extinguisher, one of the best things, by the way, to have on a car, squirt the liquid through the radiator, keeping the hood over the engine.



How reader tests spark plugs, a method he calls safe and simple



To carry the hat in the car a device of spring wire is used

Spark Plug Tester

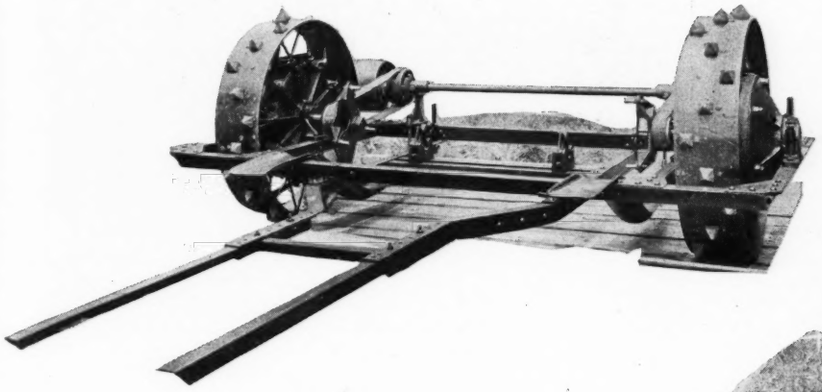
North Loup, Neb.—Editor MOTOR AGE—With the aid of the device shown in the illustration spark plugs may be tested in an instant, and with no danger of shocking the person making the test. The spark coil A is fastened to the wall and connected to the wire and tin bent as shown and insulated from each other. When the switch is closed and a plug terminal slipped under the edge of the tin, and resting upon the wire, the spark will be plainly seen if the plug is in working order.

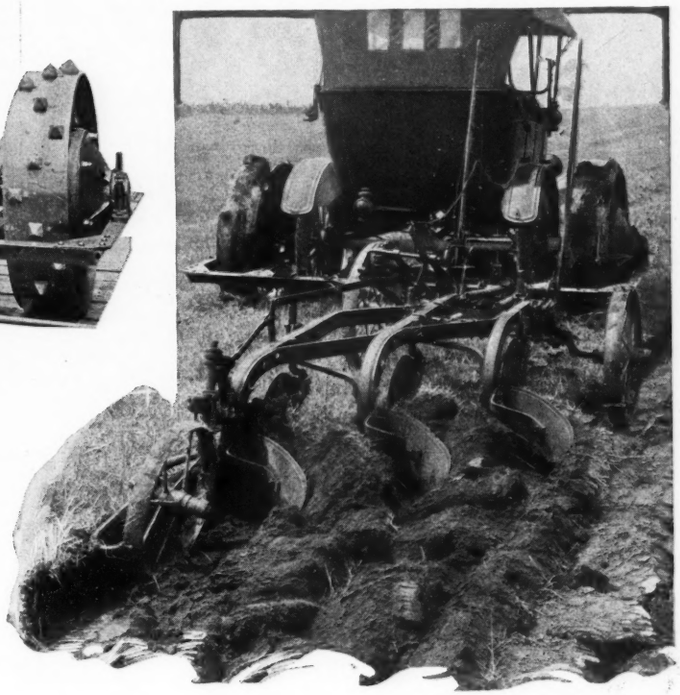
To arrange this outfit, a sheet of asbestos is tacked to the wall, large enough to cover the whole surface to be used. In order to insulate the tin from the wire of the plug holder, large holes are bored in the tin where the screws pass through and a piece of pasteboard fitted into the hole made. The screws are then put through the center of the fitting, after passing through the eyes bent on the ends of the wire and piece of stiff cardboard placed between them. The device is sure, safe and simple. —Dale R. Van Horn.

A Hat Holder

North Loup, Neb.—Editor MOTOR AGE—One often finds it convenient or even wise, if the wind is blowing hard, to remove his hat while riding in a motor car. To avoid placing on the floor or the bother of holding it, a device made of spring wire may be made to slip over the bow overhead, and holds the hat securely. The illustration shows the manner in which the wire is bent and the position the two sections have when in place on a bow. The ends are doubled to prevent any chance scratching or soiling of the hat, and if dipped in shellac, the wire will not rust or corrode. Three feet of wire is required, No. 12 spring wire being best for the purpose.—Dale R. Van Horn.

Curtis Form-a-Tractor Pulls Three Plows





Above is the Curtis unit with belt attachment ready for fitting to a Ford. At the right it is in action

THE Curtis Form-A-Tractor Co., with offices in Chicago and factory at Minneapolis, Minn., has put its tractor unit to test for the last two years in the Northwest and it has shown power sufficient to handle three 14-in. plows under average soil conditions. This unit has a belt attachment by which a Ford car may be converted into a 3 to 12-hp. stationary engine. One of the features of the Curtis unit is that nothing is removed from the Ford when attaching the converter. Three point suspension is given. The tractor consists of two wheels connected by a strong steel frame, two channel iron trucks forming a runway and cradle for the wheels of the car. There also is a lighter frame extending forward under the car for the purpose of locking and relieving the car from strain.

Each tractor wheel contains a set of reducing gears which give a speed of 4 m.p.h. for road work and 2 m.p.h. for plowing or other field work. Reducing gears and pinions are all of steel and are inclosed. There never is any racing of the engine as the start and run are both made on high gear.

All bearings are roller or heavy babbitt and special provision is made for increased radiation by using a 10-gal. cooler. The two drive wheels measure 34 in. in diameter with a face of 10 in.

The unit weighs 1000 lb. and sells for $298. This price includes the pulley attachment for stationary work.

From a Manufacturer

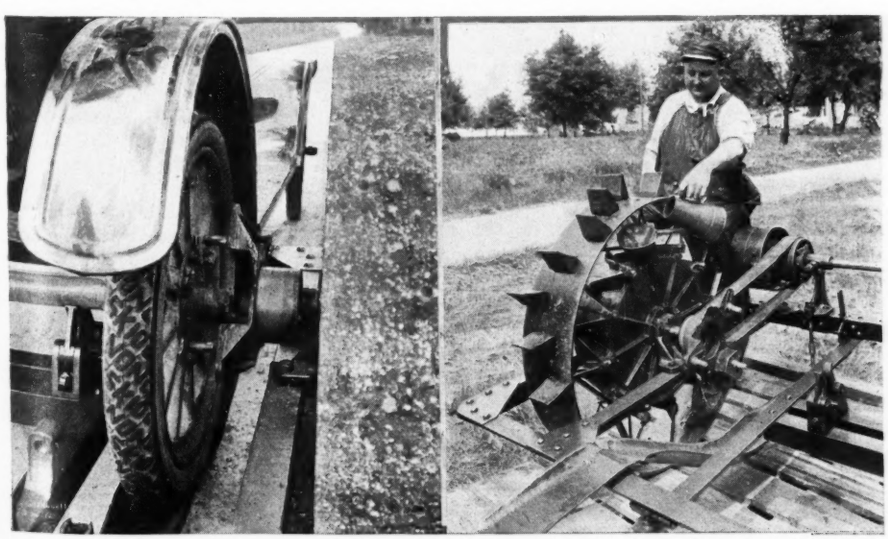
BIG RAPIDS, Mich.—Editor MOTOR AGE—We do not know whether or not MOTOR AGE receives such letters as ours, but nevertheless have decided to write you and assure you that we as manufacturers appreciate your editorial perspectives in MOTOR AGE and especially of late issues, those of Aug. 23 and 30, as also of Sept. 6, 13, and 20, with your issue of the 27th also.

Some editorial pages are confined to the author's own narrow vision and gained by a presumed study of the different points discussed, but we wish to congratulate the writer of your perspectives for the wisdom shown in the discussion of the points in any of your articles, which show that the information gained by his investigations are those of actual observation.

The suggestions offered in your columns of Aug. 30, if accepted for the next National Tractor Demonstration, would conclusively show the man contemplating purchasing a farm tractor exactly what he was buying, what it would do in actual test, the cost of operation, how operated, the construction and standardization of the tractor as to parts, and then with the dynamometer test sheet before him, Mr. Farmer would actually see what the drawbar pull of each tractor was. Over enthusiastic sales managers oft times get their enthusiasm into print and the tractor with a supposed rating at the drawbar cannot deliver, and again others are too modest and wish to have a reserve back, and in both cases it is unfair to the tractor not to have this actual drawbar dynamometer test right on the field at the demonstration.

Another good point mentioned by you would be that the demonstration committee have measured plats of ground containing a certain acreage, and have each tractor plow this ground with the following things in view for the test: Kind of plowing, depth, completed job as to neatness and thoroughness, see that depth is kept by plows over entire plat, time to plow same, amount of gasoline or kerosene consumed in plowing, time required for stoppage, and

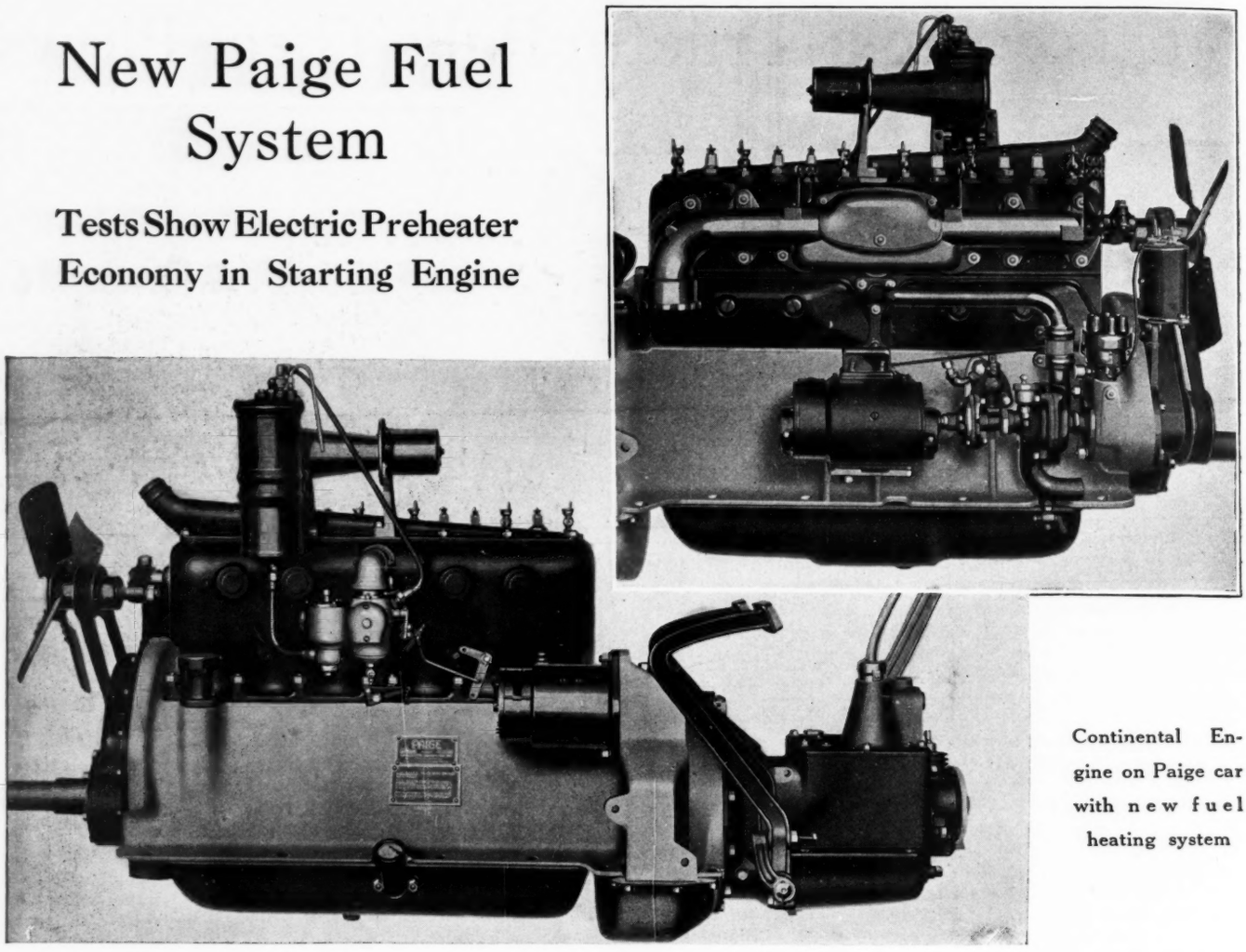
(*Concluded on page 41*)



At the left is a close-up showing how power is applied to tractor drive wheels and at the right is shown how wheels are lubricated, as well as how the belt attachment works

New Paige Fuel System

Tests Show Electric Preheater Economy in Starting Engine



Continental Engine on Paige car with new fuel heating system

PROVISIONS for winter use are made on the new Paige cars. The engine has three new arrangements whose purposes are to preheat the gasoline to make starting easier, to aid in the vaporization of the fuel after it has left the carbureter, and to make the poppet valve self-seating and eliminate grinding.

The first arrangement is a heating coil in the float chamber of the carbureter, made of a Nikrome wire-heating element fully insulated by a lava compound to stand intense heat, inclosed in a copper tube with brazed ends so that it is impossible for the current to come into direct contact with the gasoline. A control switch is accessible to the driver, and makes it possible to raise the fuel to the proper vaporizing point in less than a minute.

Test Results

Tests made by the Paige engineering department show in cold weather the heater requires about 32 amp. for 30 sec., this being sufficient to heat the gasoline to a vaporizing point where one appliance of the starter will start the engine under normal conditions. This as compared with an equal length of cranking at 90 amp. with the starting motor is considerably easier on the battery.

As shown by the accompanying illustration, the coil lies in the bottom of the float chamber and the terminal projects through the float chamber wall as illustrated. The switch can be mounted at any desired point, preferably on the dash.

The manifold feature which is incorporated in the 10-D Continental engine, used in the Paige Model 55, can be described best by referring to the illustration herewith. As will be noted the air supply passes transversely across the engine twice, the carbureter being on the opposite side of the cylinder block from the manifolds, where the hot air stove is located. The air enters through the stove surrounding the exhaust pipe, passing through the cylinder block to the carbureter. Here it is mixed with the fuel, and the mixture then passes back to the cylinder block again to the intake manifold, from which it is distributed to the intake valve as shown by the arrows. This gives a progressively heated mixture with the air moderately warm before coming into contact with the fuel and the mixture then heated in increasing stages as it passes back in close proximity to the exhaust pipe. A feature of the intake passages is the constant section which is maintained throughout the entire passage of the gas. This section remains as near circular as it is possible to keep it, thus presenting a minimum of wall area for any given volume of gas.

The third addition to the Paige engine is a spacer placed between the end of the valve stem and the tappet in such a way as to allow the valve to seat with a rotating motoin. It is well known that a coil spring when compressed tends to rotate or wind about its axis. As the valve is held fast under frictional contact with its seat, this rotating motion is not imparted to the valve with the ordinary arrangement.

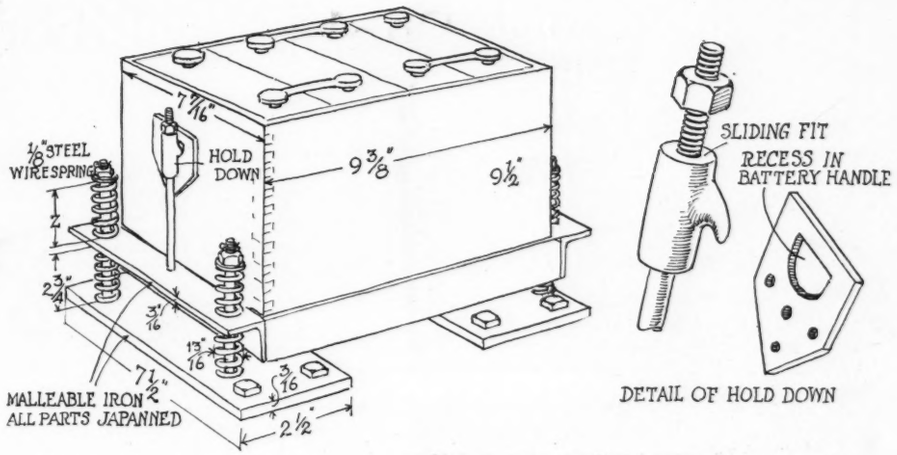
The spacer is designed to allow the valve to be free of the influence of the spring when it has reached its seat, so that the friction on the seat is reduced to such an extent that the rotary motion imparted by the spring can be transferred to the valve, thus giving a wiping action, freeing the valve of carbon and eliminating pittings. The construction is shown in the accompanying drawings. As will be seen the valve stem floats free when the tappet is at the bottom of its stroke. This allows the unwinding motion of the spring to be imparted to the spring retainer and, in turn, to the valve stem, giving it the slight rotating motion upon its seat. The valve adjustment is made by the screwed piece in the spacer.

SPRING BATTERY MOUNTING

The Vesta Accumulator Co., Chicago, is using a spring battery mounting for storage battery installation on certain trucks, whereby shocks to the battery are greatly decreased, thus promoting the life of the battery. The battery rests on a metal tray suspended between four coiled steel springs that are bolted to the truck body or running board. These frames are $\frac{1}{8}$-in. steel wire wound to $\frac{13}{16}$-in. diameter, the lower one being $2\frac{3}{4}$ in. long and the upper

one 2 in. long, and the tension on them may be adjusted by a nut at the top of the supporting bolt.

It is said that failure of batteries due to jar can be in one or two ways—either by the plates breaking down into the web supports at the bottom of the jars or by forcing the top from the battery. The effect of the springs is to cushion the shock, no matter from what direction it occurs. And it is stated that a battery in this suspension has been dropped from arm's length with little ill effect. At present it is made only for one type of battery and sells for $7.



Vesta spring battery mounting for storage battery installation on certain trucks

MORE WILLYS-KNIGHT TAXIS

Toledo, Ohio, Nov. 16—The Westcott Express Co. of New York, which already has 100 Willys-Knight taxicabs in use, has just placed an order for fifty more with Willys-Overland, Inc., of Toledo, Ohio, for immediate delivery.

FROM A MANUFACTURER

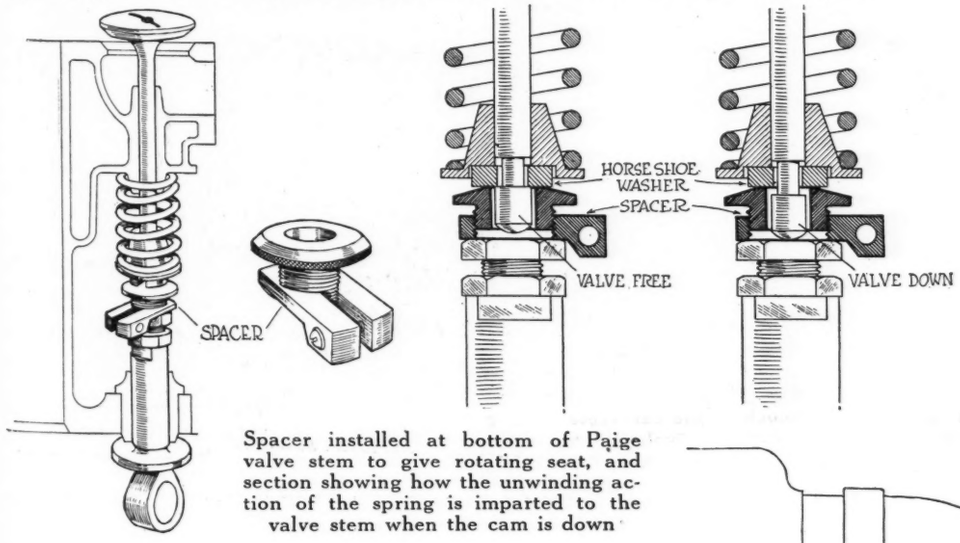
(*Concluded from page 39*)

of this time how much for repairs, etc., and then with the fuel and oil consumption, time, drawbar pull, condition of the cooling system, etc., of the tractor, the farmer or ultimate purchaser would first see the tractor in operation, could get the bonafide test records of that tractor's work, and would then be in a position to know from actual performance which machine he would buy, instead of the present methods of the demonstration, which, as any one knows who attended, are very uncertain.

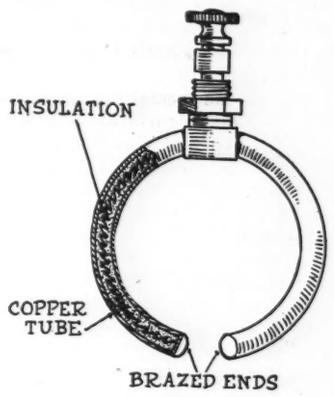
Another suggestion would be an open field and see what amount of land could be plowed at a certain depth in a certain time, and accurate tests kept of fuel consumption, cost of operation and the amount of land turned in said time. The observers or visitors at the demonstration would then have something authentic to go by, of actual performance and all tractors under the same conditions. The neatness and thoroughness of the plowing, the cost per acre, the cost of the different tractors, etc., which are the essential points are then plainly before all, especially the man who really wishes these facts before him, before he purchases a tractor.—E. J. Jenkins, president and general manager, Four Drive Tractor Co.

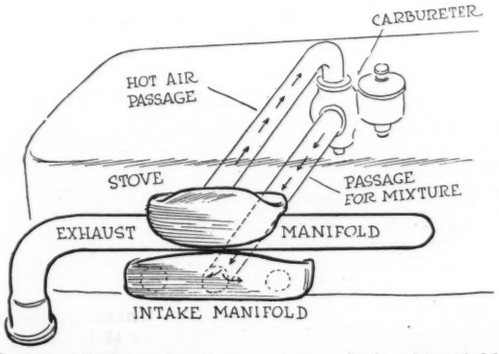
HALL-SCOTT PISTONS

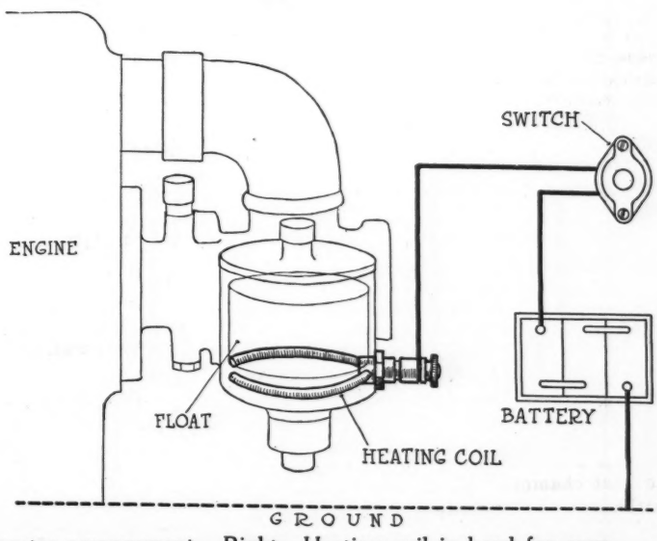
In an article on the Hall-Scott aircraft engine in the issue of Oct. 11 it was stated that die cast aluminum pistons are employed in the engine. The pistons used are made by the Lynite process of casting in metal molds and are not die cast.



Spacer installed at bottom of Paige valve stem to give rotating seat, and section showing how the unwinding action of the spring is imparted to the valve stem when the cam is down







Details of Paige heating system. Left—Manifold and carbureter arrangement. Right—Heating coil in bowl for easy starting. Upper Right—Detail of gasoline heating coil

Liberty Adds a Two-Passenger

Latest Model Rounds Out Line on Standard Chassis

THE Liberty Motor Car Co., Detroit, has rounded out its line by the addition of a two-passenger roadster. This consists of a new body mounted on the standard Liberty chassis of 115-in. wheelbase and sells for $1,350.

The lines of the new body are characteristicly Liberty, the sharp molded edge of the cowl being carried through to the rear, joining in with the deck, which slopes down to a tapered rounded point. The effect of this molded edge is accentuated by the color scheme. The body is bright red, and starting at a point near the hood, a black rounded molding follows the body lines to the end of the rear deck. Black is used on the chassis, fenders and radiator, the wheels being red with black striping.

Among the special features on this model are the Collins curtains that are easily attached and which open with the doors. The doors themselves are 23 in. wide, rendering entrance and exit exceptionally easy. Beneath the rear deck is a storage compartment sufficiently large to carry traveling bags, etc., when touring, and this compartment is equipped with a lock.

In common with the other models, the same improvements are noted in the roadster. The upholstery is pleated and of genuine leather; horse hair carpets are used, and leather pads are fitted around the clutch and brake pedals to prevent wear. The tops are better in design and finish, and a new color scheme marks the four-passenger roadster, namely, blue with straw colored wheels. On this latter model, the driver's seat is now adjustable, and on all models larger lamps are used.

WINTER TOPS FOR CADILLAC

The Erdman-Guider Co., Detroit, is specializing in the construction of winter tops for Cadillac cars. These are designed along the same lines as limousine bodies and are fitted without the usual overhanging or box effect common to many winter tops. The sides are metal and the roof leather, with all window and door corners rounded and the large front pillar eliminated to give better vision. The doors are equipped with limousine handles, which opens top and body door together, and the upper windows in all doors are dropped for ventilating purposes. The body is trimmed in gray Bedford cloth and includes a flush dome light controlled by an independent switch. Being painted black, it harmonizes nicely with the Cadillac colors. The price of the top for the type 53, 1916 seven-passenger touring car is $300, and that for the models 55 and 57 is $350.

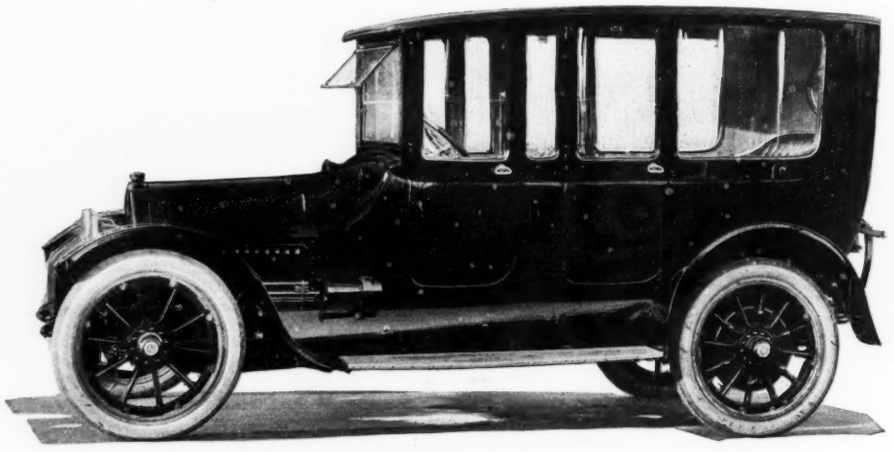
LEXINGTON SPOR-TOUR

The Lexington Motor Co., Connersville, Ind., has added a four-passenger which it calls the Spor-tour to its 1918 models, which were described in MOTOR AGE of Sept. 27. At that time only a five-passenger was announced, though it was known that several bodies would be fitted to the new chassis. The new model is $1,585.

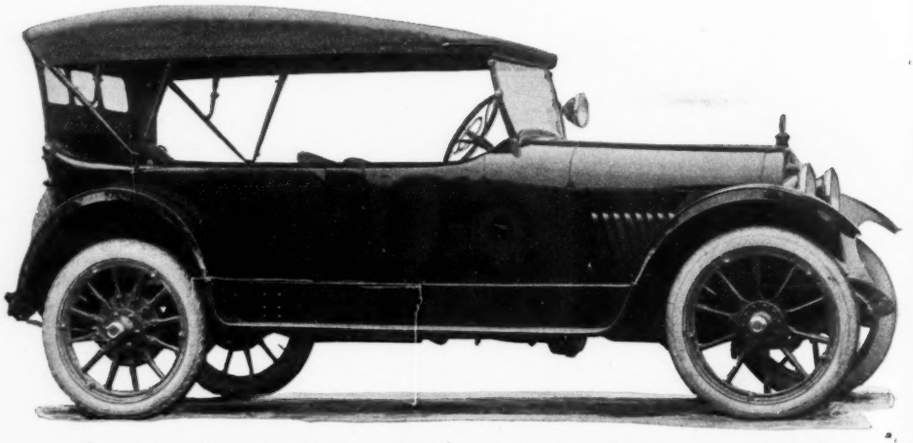
The Spor-tour is built long and low with high sides and seats tilted at the proper angle for riding comfort. The same mechanical features are found in it as in the other Lexington car, among them being the multiple-exhaust system, which was described previously.

LYONS FAIR IN MARCH

Chicago, Nov. 9—The third sample fair will be held at Lyons, France, March 1, 1918. A commercial congress will be attended by delegates from all the Allied and neutral nations during the fair. More than 600 applications already have been received from exhibitors in the United States, France, England, Italy, Switzerland, Spain and Holland. A thousand new booths will care for the expected increase. Last year it was estimated that the transactions amounted to about $80,000,000, of which $42,000,000 worth of orders were taken by Americans.



Typical Erdman-Guider top for Cadillac cars, which is supplied in black



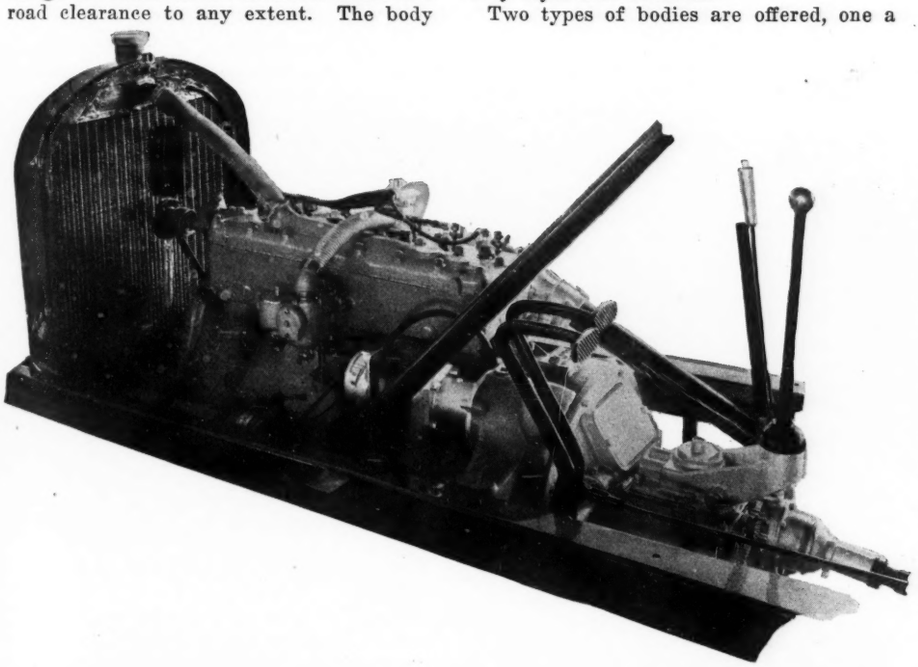
Lexington four-passenger model, the Spor-tour, which sells at $1,585

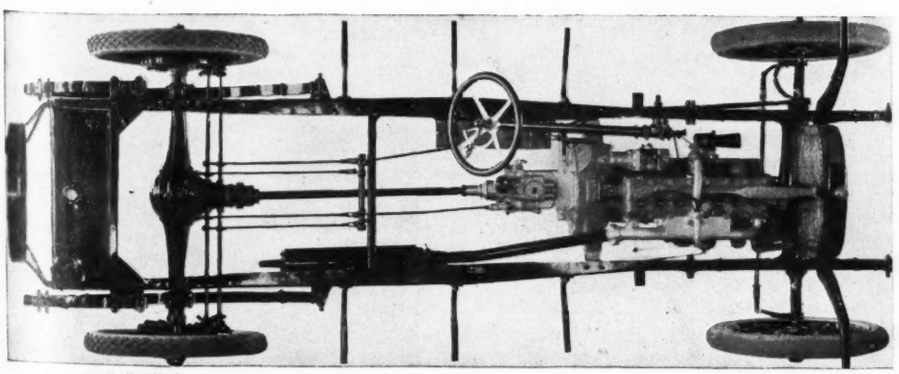
Improved Glide Line for 1918

The two 1918 Glide models, a five-passenger touring car and a four-passenger roadster

THE chassis of the 1918 Glide remains practically the same as last year's with the exception of refinements and improvements. It has been lowered 1½ in. by a different drop front axle and a new design of frame which does not affect the road clearance to any extent. The body lines have been made more graceful, which together with the lowered chassis has added greatly to its appearance. The body improvements include a slanting windshield and a new type of one-man top with Jiffy style side curtains.

Two types of bodies are offered, one a five-passenger touring car and the other a four-passenger roadster, both for $1,395. A detachable sedan top for the five-passenger car can be had for $200 additional. These cars are mounted on the same chassis of 119-in. wheelbase, which is the same as that employed in 1917. The colors this year are meteor blue for body; hood, fenders and gear, black; and wheels, white.





Chassis of 1918 Glide and view showing unit powerplant, above

The powerplant is a six-cylinder L-head block engine with a bore of 3⅛ in. and a stroke of 5 in., developing 40 hp. at 2000 r.p.m. The cylinder block is designed with a detachable head. The engine accessories include a Rayfield carbureter with an exhaust manifold preheating stove and ignition by a Westinghouse generator and distributor. Cooling is by a centrifugal pump and a two-bladed airplane-type fan.

The clutch and gearset are in a unit with the engine, the clutch being the dry-multiple-disk type with twelve plates.

The drive is through two universals and a tubular propeller shaft to the rear axle, and Hotchkiss drive is employed, torque being taken through three-quarter elliptic springs.

The rear axle is three-quarter floating with a pressed steel housing, using spiral bevel gears with a total reduction of 4.61 to 1. Gurney bearings are used throughout the assembly. Both service and emergency brakes are located on rear axle with 14-in. drums acting on 34-in. wheels.

Steering is the screw and nut type, with an 18-in. wheel. Spark and throttle control levers, together with the horn button, are mounted on top of the steering wheel.

Standard equipment includes gasoline gage, ammeter, dash lamp, trouble lamp and Stewart-Warner speedometer.

DRAWE TRUSTEE FOR MUTUAL

Jackson, Mich., Nov. 16—G. E. Drawe has been made trustee for the Mutual Motors Co., manufacturer of the Marion-Handley car. Manufacturing has ceased for the present, and an inventory is being taken. The company is capitalized for $1,000,000. Mr. Drawe formerly was treasurer.

The Accessory Corner

Push-Clean Plug

THE Push-Clean spark plug cleans itself. All that is necessary is to push the button on the top of the plug. The push cleans the porcelain, the electrode, scrapes the side wires. A patented cleaning bridge on the bottom of the shell protects the sparking points and porcelain, besides making it possible to clean the plugs while the engine is running, if so desired. Carbon and oil are removed from the porcelain by the cutters, the points of the side wires are cleaned and polished automatically, while oil and carbon are wiped off the center electrode by the bridge during the operation, which takes not more than 2 sec., it is said. Price, $2.—Wellman-Howe Mfg. Co., 21 East Van Buren street, Chicago.

Portable Shop Crane

The Pull-U-Out portable crane weighs 250 lb. and has a lift of 9½ ft., with a lifting capacity of 1 ton. It is mounted on strong roller wheels and will do the work of overhead tracks, it is said. The device is for use in hoisting and transporting heavy objects from one part of the shop to another. The Pull-U-Out can be detached from the crane and used separately for hoisting or pulling. Price, complete with Pull-U-Out, $50.—H. G. Doran & Co., Peoples Gas building, Chicago.

Extra Chair Case

This extra chair case is a device of high-grade art leather, which is water and dustproof. It is designed to make the chair last longer and keep it dry and clean. The device is strong and durable, reinforced by handle straps, and is made to match the chairs. Price, $1.25 for child's chair; $1.50 for car chair; and $1.75 for camp chair.—McKinnon Dash Co., Buffalo, N. Y.

Burke Vapor Condenser

The Burke condenser is built on the principle of the whisky still and operates to condense the alcohol vapor from the radiator and so maintain the anti-freeze mixture at its original strength. It consists of a shell to receive the vapors, the lower end being screwed into the radiator in place of the radiator cap, together with a worm to condense the vapors, which is connected to the top and bottom of the shell. A double-acting relief valve is provided and mounted on top of the shell to govern the pressure in the radiator. When the device is applied to a car the overflow pipe is closed and no vapor can escape if the radiator does not leak. The vapor is condensed and drips back into the radiator without perceptible loss of either alcohol or the water. Two models are made. Prices, standard, $10; Little Giant, $5.—Automobile Devices Co., 1619 Sansom street, Philadelphia, Pa.

How the Push-Clean plug operates

B-W Tire Pump

The B-W tire pump for Ford cars is attached to the front of the Ford crankcase and driven from the fan belt to a friction wheel. The device is single-cylinder, the piston being fitted with three rings and the intake and exhaust handled by check valves. To attach requires only a few minutes with a wrench. A pressure of 60 lb. can be obtained with it in 3½ min., it is said. Price, $6.50, with a 12-ft. hose and tire gage.—Bloom-Wallace Co., 609 Bowles building, Detroit.

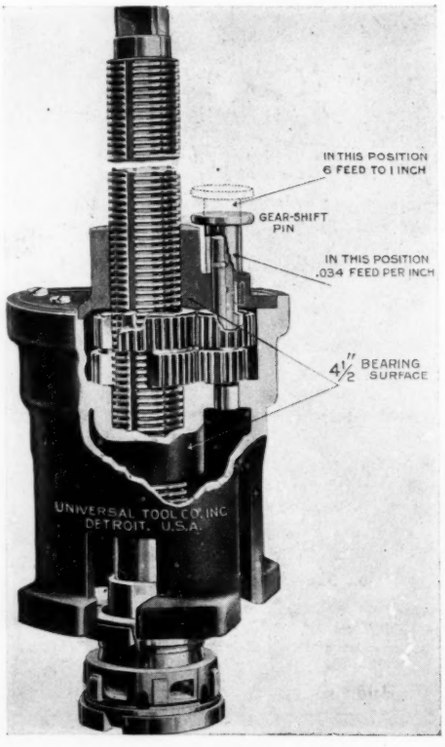
Beveled Curtain Windows

Johnson beveled plate glass windows for flexible motor car curtains are designed not to rattle, break, pull loose, sag or interfere with the manipulation of the top and curtains. Properly set, they are fully guaranteed. A special weight of plate glass is used and set into a wooden frame which is cushioned at every point. Any shop with tacks, hammer and shears can install them, it is said. While oval and round shapes are standard, other distinctive shapes are available as rapidly as they can be turned out. Prices vary from $2 each for round glass windows 4 in. in diameter to $8 for ovals 20 by 10 in.—William R. Johnston Mfg. Co., 359 East Ohio street, Chicago.

Singer Traffic Signal

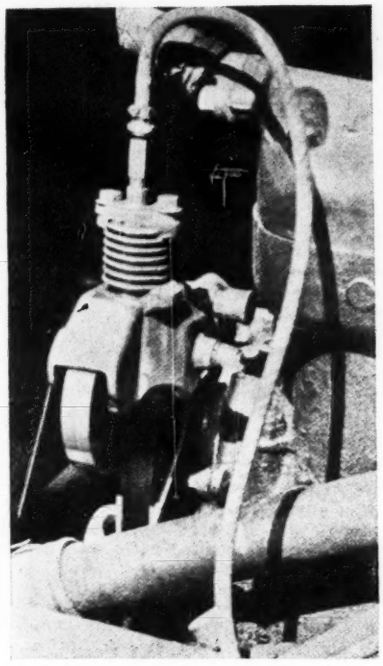
The outstanding safety feature of the Singer signal is the emergency brake control, a device which causes the signal "Stop" to be flashed automatically when the brake is put on, regardless of any other signal that is shown at the time. The signals are operated from the battery and can be read easily 100 ft. away, day or night, an electrical display being available for night. By pressing a button the words "Stop," "Ahead," "Back" and the arrows indicating left and right appear on the front and rear of car. Small enamel cases contain the signals, one on the rear

Pull-U-Out portable crane for shop



Improved Universal cylinder reboring tool

Case for the extra car chair



B-W tire pump for Fords

and the other in front. A pilot light extends over the button disk and indicates to the driver whether the signals are operating.—Singer Auto Traffic Signal Co., 2829 Locust avenue, St. Louis, Mo.

Anti-Draft Shield

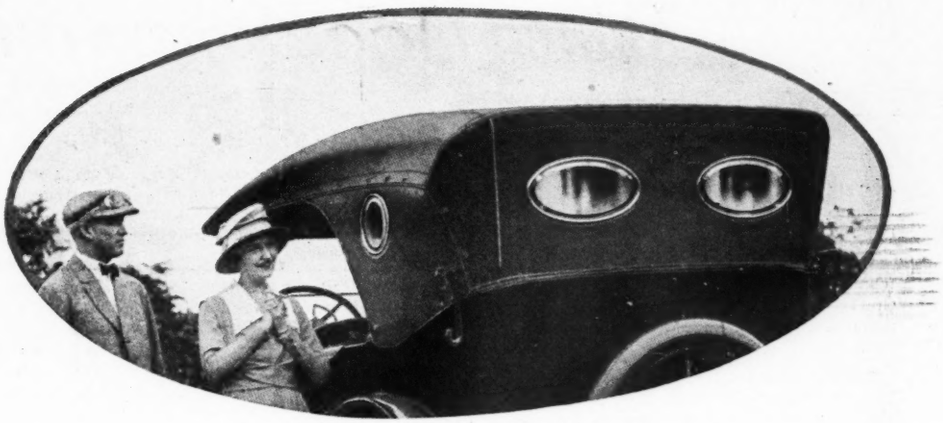
The Anti-Draft shield is made to fill the gap between the top and the windshield of the Ford car. It can be attached in a few minutes and is made of the same material as the top. The device is arranged so it can be tied up out of the way when the shield is opened during warm weather. Price, $1.50.—American Automobile Accessories Co., Cincinnati, Ohio.

Crystal Glass Lens

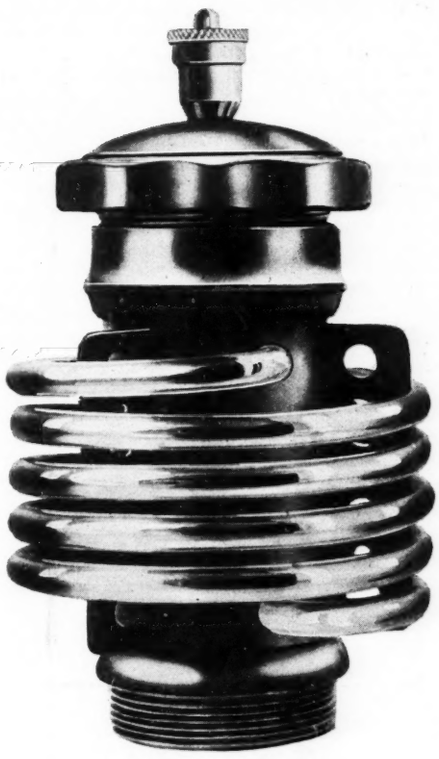
The Long crystal glass lens, though designed to eliminate glare, floods the road with an even diffused light that has a clear range of 500 ft., it is claimed, with no rings or shadow. It has a smooth front surface that is cleaned easily and does not clog with dust, mud or snow. Prices, 8 to 8½ in., $1.50 a pair; 8⅝ to 9 in., $2 a pair; and 9¼ to 10 in., $2.50 a pair.—Long Brothers, Kokomo, Ind.

Universal Reboring Tool

The new Universal cylinder reboring tool has been improved in many respects. It permits reboring of cylinders with connecting rod clearance at the bottom without the scraping possible with the former tool and enables cylinders having deep scores or an oil hole through the side to be rebored without difficulty. Though the new tool operates upon exactly the same principles as the former tool, whereby a cutting head is rotated by a hand-operated screw spindle held in a metal support, the appearance of the two are not similar. The improved tool employs six hardened steel cutters instead of four as before. When one cutter is passing over an opening and is not removing material, five other cutters are in contact with the cylinder walls and are removing material. Hence, there is no chance for the head to change its relative position in the cylinder and thus to bore a hole otherwise than dead true. The tool may be used to rebore cylinders from 2½ to 5⅛ in. in diameter on any engine. Approximately 2 hr. are required to rebore six cylinders. A Ford may be rebored in about ½ hr. All parts of the device are made according to gage measurements and are interchangeable. The tool may be reground in a shop provided with the necessary equipment, but the best plan is to exchange them for a new set of tools at the factory. This can be done for a cost of approximately $2 and the resharpened tools will rebore from fifty to seventy-five cylinders.—Universal Tool Co., 916 Beaubien street, Detroit.



Johnson beveled plate glass windows



Burke alcohol vapor condenser

Cylinder Head for Fords

A new cylinder head for Ford cars is sturdily built of cast iron and resembles the Hudson cylinder head. It is built with extra large waterjacket holding approximately ½ gal. more water than the standard Ford cylinder head. The waterjacket completely surrounds the spark plugs, keeping the plugs cool at all times and preventing injurious steam pockets. The largest part of the combustion chamber is directly over the valve, and the inside of the head is perfectly smooth, no mass of iron projecting into the cylinder where the spark plugs enter. It is said the new cylinder head gives additional power and speed as well as saving fuel. Standard S. A. E. spark plugs can be used. Price, $16.—Green Engineering Co., 34 South St. Clair street, Dayton, Ohio.

Peerless Specialties

In getting out its tenth semi-annual trade circular the Columbus Varnish Co., Columbus, Ohio, calls attention to its line of Peerless motor car specialties, which take care of the car wherever it needs wax, varnish, shellac and so on. Its two new products are the Peerless anti-freeze and Peerless carbon remover.

Oxy-Acetylene Welding

"Turning Waste Into Profit" is a booklet devoted exclusively to the possibilities of reclaiming broken and worn machinery and metal parts for service by the oxy-acetylene process. It contains eighty-two illustrations, picturing and describing representative examples of reclamation welding work in practically every field of the industry. In the face of present high prices and scarcity of metal equipment the subject of welding is receiving more than usual consideration, and this is a guide to plant owners interested in holding down the scrap heap. The booklet is published by the Prest-O-Lite Co., Inc., Indianapolis, Ind., and is mailed to any interested executive on request.

Front Seat Robe

The Frunt-Seet motor robe is made to fasten on the dash board at the bottom of the windshield and to the sides of the car, with a special flap to fit around the steering wheel post. The robe rests flush across the frame of the car, lapping on all sides, and reaches from the dash board to the chests of the passengers in the front seat, keeping the cold air out and the engine heat in. The method of attachment is devised to eliminate inconvenience to the driver in operating the car. Prices, reversible, plush with heavy cloth lining, to fit right or left hand drive, $8; rubber and heavy cloth lined, $6; rubber and khaki cloth lined, $4.50; old model Ford cars, $8, $6 and $4.50.—Automobile Apparel Co., Port Chester, N. Y.

Among the Makers and Dealers

MILLER Assists Chalmers Sales—Harry W. Miller has been appointed assistant sales manager and service supervisor of the Chalmers Motor Co.

Kraft Now In France—Herman T. Kraft, formerly with the airplane department of the Goodyear Tire & Rubber Co., is now an airplane engineer in France with the air squadron.

Sheldon Axle Places N. Y. Distributor—The Chadick-Delamater Corp. will represent the Sheldon Axle & Spring Co. for the distribution of parts in New York and vicinity. A complete stock of parts will be carried at a service station.

Standard Parts Heads Meet—Fifty production and sales managers and other division heads of the Standard Parts Co. attended a get-together dinner recently during a two-day meeting of the manufacturing staff. The company's Cleveland plants were inspected by representatives of factories in other cities.

Duplex Truck Moves—The Duplex Truck Co. is moving its equipment from the Charlotte, Mich., plant to the new factory at Lansing. Owing to a freight car shortage, trucks are being used. It is expected that all the machinery will be installed and in operation by Dec. 1. From 300 to 400 men will be employed.

McCord Company Increases Capital—The McCord Mfg. Co. has equipped its plant so that 200 radiators a day can be turned out for Government work, if necessary. At present considerable Government orders are on hand for radiators, part of which are for the standard Government truck and part of which go to truck manufacturers that are filling Government orders. Some time ago a gasket manufacturing plant was constructed at Wyandotte and at present a power plant is being built at the Detroit factory.

Haynes to Open Detroit Branch—The Haynes Automobile Co., Kokomo, Ind., will open a factory branch at Detroit with D. L. Watson in charge. Mr. Watson was assistant general manager of Haynes. The Detroit branch makes four branches for Haynes, the others being in New York, Chicago and San Francisco.

Sturgess Joins Stanley Steamer—John Sturgess has joined the engineering staff of the Stanley Motor Carriage Co., Newton, Mass. Mr. Sturgess was for many years with the Platt Iron Works Co., Dayton, Ohio, where he specialized on powerplant design and construction.

Celebrates Its First Anniversary—The Bearings Service Co. celebrated the anniversary of its first year of operation by window displays representing a birthday dinner party, at which twenty-two plates, signifying the number of branches, were set. The display was used at all the branches. Timken bearings were built up to form candlesticks, Hyatt outer races being used for napkin rings and New Departure bearings as supports for the place cards.

Electric Auto-Lite Holds Convention—The Electric Auto-Lite Corp., Toledo, Ohio, is holding a three-day service representative convention, and about 200 delegates are present. The purpose of this convention is to better the Auto-Lite service by exchanging of ideas and the program for each day calls for an inspection of some part of the manufacture of the starting, lighting and ignition system.

Sutton Traveling for Denby—E. T. Sutton has been appointed representative for the Denby Motor Truck Co. in the territory from North Dakota to Oklahoma, with headquarters in Omaha, Neb.

Damon Represents Anderson Electric—Harry E. Damon has been appointed southern representative of the Anderson Electric Car Co., manufacturer of the Detroit Electric.

Crawford and Cox to Allen—James M. Crawford, formerly assistant chief and designing engineer of Chalmers, has been appointed chief engineer for Allen. Clyde C. Cox, who was associated with Mr. Crawford, has been made assistant engineer.

Blommers in New Marathon Place—Pierre Blommers, who has been manager at New York for the Marathon Tire & Rubber Co., has been appointed special factory representative, with headquarters at the home office, Cuyahoga Falls, Ohio. P. L. Niles, formerly western manager for the Republic Rubber Co. at Kansas City, Mo., succeeds Mr. Blommers at New York.

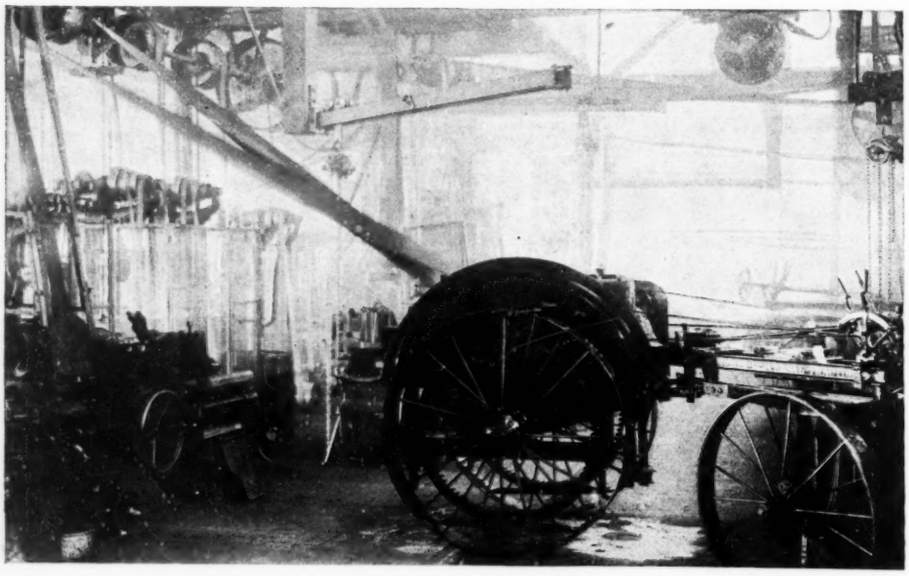
Goodyear Builds Industrial Village—Goodyear has erected eighty-eight workmen's houses, a hotel for fifty men and a seven-story storage building at its cotton mills, Killingly, Conn. Most of the houses were built either semi-detached or in blocks of four. The whole of the work, including the water supply and a sewer nearly a mile long, was completed in three months.

Biltwell Tire Organizes—The Akron Biltwell Tire & Rubber Co., Akron, Ohio, has incorporated for $200,000 to manufacture tires, tools and accessories. Preferred stock to the amount of $250,000 and common stock to $50,000 is being issued. M. Braley is president and general manager, William M. Graham, vice-president, and J. F. Risch, secretary and treasurer.

Ecorse Foundry Buys More Land—The Ecorse Foundry & Machine Co. has purchased 7 acres adjacent to its original plot of 8 acres, and will construct a factory addition to cost approximately $100,000. The first two units of the new plant have been under construction since early in October, and are now ready for the roof. The additions to these buildings are 30 by 50 ft. and 100 by 60 ft. respectively.

Packard Advertisers Meet—The branch advertising managers of the Packard Motor Car Co. held a convention recently to discuss dealer advertising. Representatives were present from New York, Chicago, Cleveland, Philadelphia, Pittsburgh and all the larger centers. The Packard company is preparing an advertising campaign from the dealer's angle, and the purpose of the convention is to obtain a first-hand knowledge of what is desired.

Goodrich Gives Idea Prizes—The B. F. Goodrich Co. employs the "suggestion idea" from employees on benefiting its production and recently distributed prizes for suggestions received in the last year. From 801 employees 1266 suggestions were received, the majority coming from the men, but many from the women. One man presented twenty-five suggestions and received prizes for four



TRACTOR PLANT RUNS UNDER OWN POWER—Necessity as the mother of invention recently was demonstrated at the Moline-Universal tractor plant. When the transformer, through which the electricity passes for supplying power to the great machine shop, was burned out from overload, it did not take long to run in tractors from the testing room and place them at different points in the machine shop, where they could be belted to the line shafting. In this way the work of running the lathes, shapers, boring machines, milling machines, etc., was divided up among the tractors and the plant was soon running as strong as ever. The tractors were run from 600 to 1400 r.p.m. Some of them were run considerably above the maximum speed, which is from 1000 to 1100 r.p.m. One tractor ran at over-capacity for 48 hrs. without slowing down an instant. Then the fuel tank was refilled and it was started again and ran for 72 hrs. without stopping. In this way the tractors were put to terrific tests

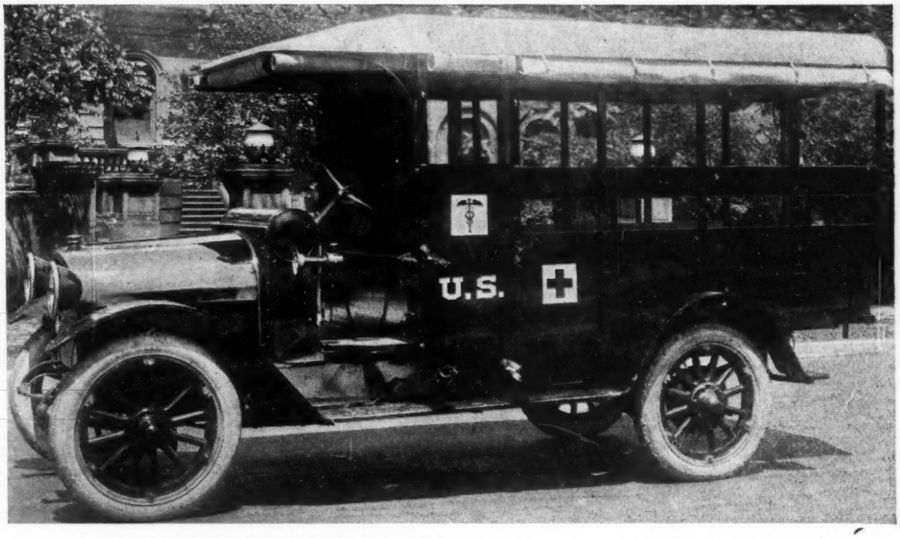
of them. The rewards are not made according to any fixed schedule, varying with the nature of th esuggestion, some being at $25 each and others as low as $9 each.

Fuller & Sons Entertains—Fuller & Sons Mfg. Co. entertained its employees at the third annual winter picnic Nov. 10. One of the floors in the new plant was used for dancing. The factory is practically completed, and several of the departments already have been moved.

Electric Welder Co. Reorganizes—The Electric Welder Co., Lansing, Mich., has reorganized and recapitalized to carry out an increased production and distribution plan. H. F. Harper is president. This company moved to Lansing about a year ago, and in addition to manufacturing electric support welders also makes an electric starter for Ford cars. At present its production is devoted almost exclusively to the starter for Fords and reorganization involves an extended merchandising campaign.

Laurel Motors to Build—The Laurel Motors Corp., which has taken over the Laurel Motor Car Co., has purchased a factory site at Anderson, Ind., and will build a plant for the manufacture of cars and trucks. It is expected the new plant will be ready about Jan. 1. The Laurel company has been making cars at Richmond, Ind., for the last two years. Pending the completion of the new plant, the Laurel will be produced in temporary quarters at Anderson.

Goodyear Starts Aeronautics School—The Goodyear Tire & Rubber Co. has started a factory school to instruct its employees in aeronautics. This course will occupy two evenings a week, and will incorporate a considerable amount of mathematics. All applicants must have a high school course, or its equivalent, and a smal tuition fee is required to cover necessary expenses. This course



HELPING THE RED CROSS WORK—Above is reproduced a Remo ambulance body made by Auto Remodeling Co., Chicago, for the Red Cross

was deemed necessary as the Goodyear company is manufacturing a large amount of ma terial for the Signal Corps.

Maxwell Woman Workers Increase—At the Oakland avenue plant of the Maxwell Motor Co. women are largely replacing men in certain branches of work. At present about thirty-five girls are employed as drivers around the plant. These girls take the cars after they have passed the final inspection, drive them to the warehouses or to the loading docks or do any necessary driving around the plant. The wages they receive for this class of work are the same as were formerly paid, and the work is proving entirely satisfactory.

Bennet Manages Buick Branch—A. C. Bennet has become manager of the Pittsburgh branch of the Buick Motor Car Co. He was formerly sales manager of the Chicago branch.

Enters Motor Supply Line—The Downing Electrical Co., wholesale telephone and electrical supplies, Des Moines, Iowa, has entered the motor car supply line and will do a strictly jobbing business. H. F. Shepard will have charge of the motor car supply department.

Recent Incorporations

Anderson, Ind.—Roof Motor Specialty Co.; capital stock, $50,000; incorporators, Robert M. Roof, James A. McMyler and William N. Durbin.

Buffalo, N. Y.—Angola Tire & Rubber Co.; capital stock, $1,000,000; to manufacture motor cars and deal in tires and rubber goods; incorporators, Frank M. Wood, Marcus M. Levery and Stephen C. Kelly.

Burlington, Wis.—Burlington Motor Truck Co.; capital stock, $50,000; to manufacture truck attachments for Ford chassis; incorporators, G. C. Rasch, George W. Waller and W. G. Rausch.

Brewton, Ala.—Eclipse Shock Absorber Co.; capital stock, $10,000; to manufacture shock absorbers for motor cars; incorporators, W. A. Creek, T. H. McDonnell and James E. McDonnell.

Buffalo, N. Y.—Transcontinental Motor Truck Corp.; capital stock, $1,250,000; to manufacture trucks, engines, motor boats, etc.; incorporators, E. S. Stengel, R. A. Schmidt and P. J. Bloxham.

Cleveland, Ohio—Weger Aeronautical Motor Co.; capital stock $200,000; to manufacture airplane engines; incorporators, H. H. Breisford, C. B. Corlett, S. G. Fleisher, A. L. Hamminck and L. A. Osten.

Cleveland, Ohio—Public Service Tire & Supply Co.; capital stock, $10,000; incorporators, H. J. Alperin, Stella Alperin, M. M. Gibbon, C. W. Dille and Joshua Thorne.

Cleveland, Ohio—Jordan-Ohio Co.; capital stock, $50,000; incorporators, H. D. Cushman, James H. Griswold, H. D. Palmer, J. W. Smith and James Formanek.

Chillicothe, Ohio—Chillicothe Transit Co.; capital stock, $10,000; incorporators, Charles P. Salen, Harry E. Johnson, B. Grebe, M. Fahey and Frank V. Nord.

Cleveland, Ohio—Dual Carburetor & Mfg. Co.; capital stock, $100,000; incorporators, George F. Hart, Joseph Schauweker, C. E. Petot, James T. Schauweker and Harry H. Baer.

Cleveland, Ohio—Owen Tire & Rubber Co.; capital stock, $800,000; incorporators, Charles S. Reed, W. K. Gardner, George S. Eicheiberger, C. H. Beardslee and I. L. Winsper.

Cleveland, Ohio—Service Auto Storage Co.; capital stock, $500,000; incorporators, A. M. Gordon, Joseph Newman, Irwin Harris, Henry A. Beckerman and S. M Davis.

Cynthiana, Ky.—Harrison County Motor Car Co.; capital stock, $20,000; incorporators, Edgar Gragg, Thomas Northcutt and W. A. Parish.

Dallas, Tex.—Yesner Motor Co.; capital stock, $10,000; incorporators, Leon M. Yesner, Henry T. Levy and Victor H. Hexter.

Dayton, Ohio—P. T. Wheel Co.; capital stock, $50,000; incorporators, G. H. Gorman, E. J. B. Gorman, A. M. Leoni, A. B. B. Gorman and O. B. Brown.

Decatur, Ill.—Mixrite Carburetor Co.; capital stock, $10,000; incorporators, C. H. Gillespie, E. H. Williams and A. A. Granger.

Dayton, Ohio—Jones-Gist Co.; capital stock, $10,000; incorporators, B. W. Jones, C. C. Fisher, G. G. Gist, Nora L. Jones and E. Josephine Jones.

Detroit—Walker Universal Joint Co.; capital stock, $350,000; incorporators, George E. Walker, Adelbert E. Lindley and H. A. Hathaway.

Greenville, S. C.—Dixie Automobile Co.; capital stock, $5,000; incorporators, W. B. Stafford and C. B. Scott.

Detroit—Underhood Motor Heater Corp.; capital stock, $65,000; incorporators, Stephen Kaladzie, Samuel V. Kowrack and James B. Giern.

Detroit—All-Power Truck Co; capital stock, $100,000; to make power wagons; incorporators, S. V. Dusseau, M. G. Dusseau and J. P. Lavigne.

Detroit—Aluminum Welding Works; capital stock, $5,000; incorporators, Louis D. Crusoe, L. F. Rogers and W. D. Newman.

Galva, Ill.—Galva Motor Co.; capital stock, $20,000; incorporators, George A. McClintock, Warren O. Houghton and Merrill M. Kistner.

Greenville, Mich.—Atlas Electric Storage Battery Co.; capital stock, $40,000; to make electric storage batteries; incorporators, George C. Bower, David Longnecker and M. J. Brown.

Georgetown, Del.—National Tractor Co.; capital stock, $2,500,000; to manufacture tractors and parts; incorporators, Woodburn Martin, C. W. Cullen and Albert Worth.

Highland Park, Ill.—Continental Car Co. of America; capital stock, $20,000; incorporators, Albert Latta, O. W. Summers and Irving Mitler.

Indianapolis, Ind.—C. C. Madison Mfg. Co.; capital stock, $50,000; to manufacture attachments for traction wheels and other devices; incorporators, M. O. Madison and G. L. Madison.

Jersey City, N. J.—Des Lauriers Aircraft Co.; capital stock, $5,000,000; to manufacture airplanes; incorporators, John De Wary, Royal R. Kelly and Harry A. Dahlen.

Kenton, Ohio—Northway Motor Organization Co.; capital stock, $30,000; incorporators, Arthur M Rosenthal, Frank Schinderwolf, C. C. Patton and C. M. Casena.

Kansas City, Mo.—Dort Sales Co.; capital stock, $25,000; incorporators, Roy R. Bush, William H Morgan and Chester B. Magill.

Lexington, Ky.—Mammoth Motor Car Co.; capital stock, $30,000; incorporators, Brooks Taylor, J. C. Taylor and J. J. Taylor.

Madison, Wis.—Washington Motor Car Co.; capital stock, $5,000; incorporators, Charles F. Bender, E. G. O'Brien and E. H. Whitcomb.

Oklahoma City, Okla.—Heckethorn Bradley Motor Sales Co.; capital stock, $5,000; incorporators, F. E. Heckethorn, Edward Howell, Shawnee, and C. M. Bradley.

Ottawa, Kan.—Ottawa Motor Sales Co.; capital stock, $10,000; incorporators, John Nelson, S. B. Weidner and Edward Nelson.

Louisville, Ky.—Haynes Motor Sales Co; capital stock, $10,000; incorporators, Charles Tway, W. S. McDonald and Milton Lavely.

Pearl River, N. Y.—Mogul Tires Co, Inc.; capital stock $2,500,000; to manufacture motor car tires and other rubber goods; incorporators, Arthur R. Oakley, William E. Shields, Jr., and Richard A. Webster.

Plainfield, N. J.—Somerset Motors Corp.; capital stock, $25,000; to manufacture motor cars; incorporators, C. Holt, Jr., F. L. Holt and I. L. Englehart.

Sisseton, S. D.—Carlberg Co.; capital stock, $30,000; incorporators, W. F. Carlson, N. J. Carlson and E. J. Vaage.

St. Louis, Mo.—Ollie E. Haupt Motor Co.; capital stock, $12,000; incorporators, Ollie E. Haupt, Carl W. Schoenig and Emil G. Haupt.

Sand Springs, Okla.—Ozark Motor Co.; capital stock, $5,000; incorporators, C. H. Lartz, S T. Richardson and Letitita Lortz.

Thermopolis, Wyo.—Lee Auto Co.; capital stock, $20,000; incorporators, Arthur K. Lee, S. S. Lee and Bert Lawson.

Warren, Ohio—Eakin Auto & Supply Co.; capital stock, $5,000; incorporators, C. A. Yahrling, C. M. Eakin, M. H. Eakin, O. L. Reeder and O. B. Reeder.

Zanesville, Ohio—Zanesville Motor Car Co.; capital stock, $10,000; incorporators, R. G. Farmer, E. A. Evans, M Randolph, Edward R. Meyer and Charles H. Duvall.

Walkerville, Ont.—Motor Products Corporation, Ltd.; capital stock, $500,000; incorporators, J. H. Coburn, A. J. Gordon and W. L. McDowell.

Wilmington, Del.—Tire Shop; capital stock, $65,000; incorporators, Walter Brinton, Robert O. Cook and Nathaniel W. Howell.

Youngstown, Ohio—Nash-Pittsburgh Motors Co.; capital stock, $125,000; incorporators, S. A. Pfau, Ben F. Spencer, L. B. Webb, E. M. Mincher and William E. Pfau.

Youngstown, Ohio—Fredericks Taxicab & Transfer Co.; capital stock, $50,000; incorporators, A. J. Auhroy, Fred G. Frederick, A. E. Burky, Reuben Smith and W. F. Diefenderfer.

From the Four Winds

Coming Motor Events

MEETINGS

Jan. 11-16—New York, National Association of Automobile Accessory Jobbers, convention.

SHOWS

Dec. 3-8—Akron, Ohio.
Jan. 5-12—New York.
Jan. 9-27—Cleveland, Ohio.
Jan. 11-18—Washington, D. C.
Jan. 11-19—Providence, R. I.
Jan. 11-19—Philadelphia, Pa.
Jan. 18-24—Milwaukee, Wis.
Jan. 19-26—Montreal, Canada.
Jan. 19-27—Cleveland, Ohio.
Jan. 21-26—Scranton, Pa.
Jan. 21-26—York, Pa.
Jan. 21-26—Portland, Ore.
Jan. 22-26—Baltimore, Md.
Jan. 26-Feb. 2—Chicago.
Feb. 2-9—Minneapolis, Minn.
Feb. 9-16—Kansas City, Mo.
Feb. 11-16—Kansas City, Mo.
Feb. 11-16—St. Louis, Mo.
Feb. 11-17—Toledo, Ohio.
Feb. 18-23—Syracuse, N. Y.
Feb. 18-23—Grand Rapids, Mich.
Feb. 18-23—Springfield, Ohio.
Feb. 18-23—Des Moines, Iowa.
Feb. 18-25—Pittsfield, Mass.
Feb. 18-27—South Bethlehem, Pa.
Feb. 26-March 3—Omaha, Neb.
March 2-9—Boston, Mass.
March 20-23—Trenton, N. J.
April 9-13—Stockton, Cal.

MAKING HAY WHILE THE TRUCK IS HANDY—Here is how a farmer uses a Reo truck in the hayfield. It loads the wagons and hauls them to the barn, and while the load is removed the truck goes to the field and loads another wagon

HOOSIER Club Wants 5000—The Hoosier Motor Club has started a campaign to obtain a membership of 5000. The organization now has less than 1000 members. It will hold a series of luncheons each Wednesday at which prominent speakers will be invited to deliver addresses. Subjects of interest to the 22,000 car owners of Indianapolis will be discussed.

Captain Kidds of Stolen Cars—Somewhat out of the ordinary in making away with stolen cars was the method of Springfield, Mass., thieves, who buried a car in a lonely wooded spot not far from the state line. Boys passing discovered what appeared to be a newly made grave and notified the police who, when they dug a short time, uncovered a windshield. The car bore a Massachusetts license and had been reported stolen in Springfield.

Columbus Motorists to Advertise City—The Columbus, Ga., Chamber of Commerce has purchased embossed metal signs, with Columbus, Ga., upon them, which are to be sold at a price just about cost to motorists. The signs are to be placed in a conspicuous place on the machine to advertise the city.

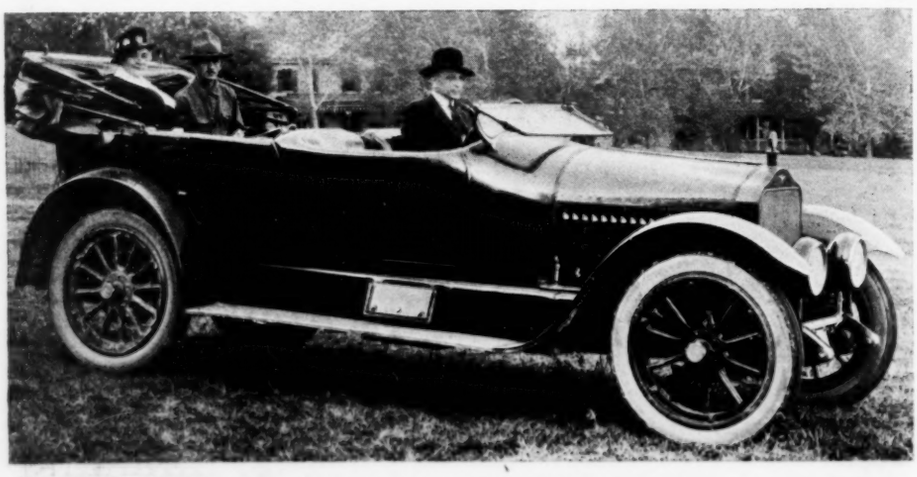
Food Administration Investigates Tractor—The Ohio food administrator is conducting an investigation of the state to determine the practicability of the farm tractor. Letters have been sent to all of the crop commissioners and agricultural agents for accurate data on increased production resulting from tractor use.

How Washington Cars Have Increased—The state of Washington has 28,350 more motor vehicles now than last year. The per capita ownership at present is one machine for every seventeen persons, giving a total of 92,321 machines. The increase in passenger cars alone amounts to 46 per cent, 75,856 being registered this year and 51,850 last year. Truck increase is 71 per cent, the total number being 10,468 for 1917, as against 6101 in 1916. The receipts from licenses amount to $487,674, an increase of 48 per cent, of which between 85 and 90 per cent is to be used as state highway maintenance.

To Show Farm Tractors—The National Farmers' Exhibition is to be held at Toledo, Ohio, Dec. 5-15. Farm machinery, tractors, etc., will be exhibited, together with farm lighting systems and gasoline engines.

Car Theft Record for City—From Jan. 1 to Oct. 15, this year, 1725 motor cars were stolen in St. Louis, Mo. The police reports show that each month an average of $7,000 worth of accessories are stolen from cars. The police records are not complete on recovered cars because many persons fail to report recovery, but it is estimated that 180 of those stolen this year were not recovered. In 1916, 850 cars were stolen and thirty-seven not recovered. This year the proportion of joy riders who steal for a ride is less. Three professional bands of thieves have been broken up. The last was a man who gave up a profitable insurance business to sell stolen cars in the country, ordering the thefts by men in his employ after the customer had indicated the kind and price wanted. The latest industry is of persons who hunt out stolen and deserted cars and hide them until a reward is offered.

Minnesota License Laws Changed—New licenses for Minnesota cost $5 for three years, beginning Jan. 1, 1918. The former price was $1.50. Motorcyclists will have to get tags for three years and the cost is $3, as compared with $1.50. The tag net proceeds go to the state road and bridge fund and gross proceeds are expected to reach nearly $1,000,000 in 1918. Men employed by manufacturers and dealers in demonstrating in Minnesota do not need a chauffeur's license, unless they drive a machine of some other firm or get pay for the service. Chauffeurs will pay $1.50 for license, and renewal badges will cost $1 a year. The owner will be licensed instead of the car. He is responsible for the number wherever placed. In case a machine is sold and the number goes with it, the purchaser must re-register the car and pay a fee of $1. Owners of cars may carry passengers for hire without being licensed chauffeurs, which they cannot do under the old law. Dealers' licenses will cost $20 a year.



WHEN A SINGER GOES MOTORING—Madame Schuman Heink has four sons enlisted, and this shows her in a White at Camp Funston, Kan., with one of them